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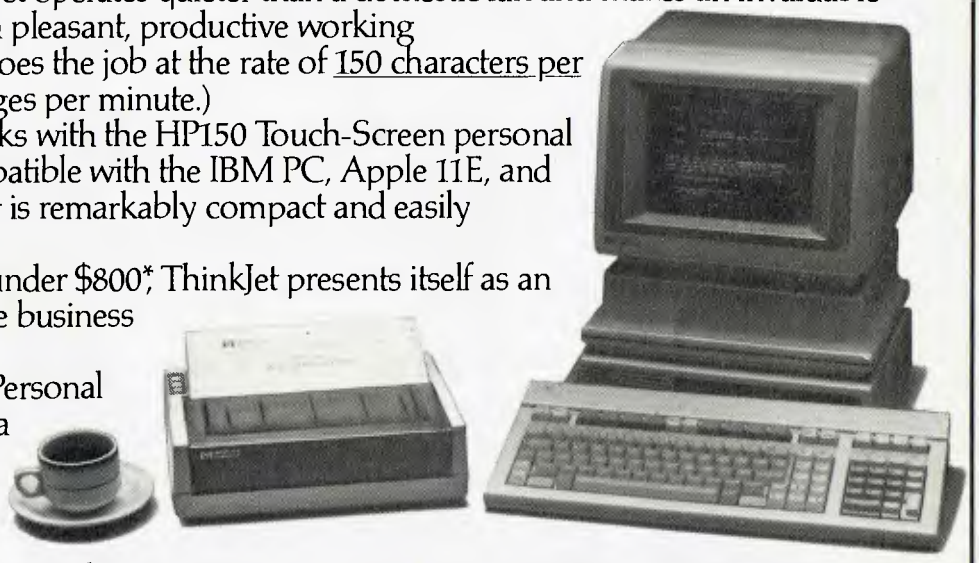

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*Of mice and men: the editor putting on a brave front in the face of a friendly assault by a computer mouse.*

# EDITORIAL
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*This publication was born somewhere between the main course and the port, during a rather long lunch. That alone should give you a clue we're quite unlike any other computer magazine in Australia. For a start, we're written entirely in the Queen's English, as it is spoken Downunder. No American apple pie, and very definitely no computerese.*

*Allow me to explain. The lunch happened several months ago. With Matt Whelan, founding father of* Your Computer *magazine, I sat down to re-live old times. The conversation went something like this:*

*Me: Matt, I know your magazine is the biggest selling computer monthly in the country, but I've bought a few, and I can't understand a blind word. It's all too infradig; it presumes knowledge I don't have. Quite frankly, it's hard to read.*

*Whelan: What you're saying is it's too advanced for you?*

*Me: Dead right. Too technical, and besides, it's not really written in English, is it? It's full of stuff about bits and bytes and funny code words like MS-DOS. Mate, I might be very slow, but can you please run some stories for wet-behind-the-ears novices like me; and could they please be written in English?*

*Whelan: OK, you've got the job. But I don't just want a story or two, I want a magazine full of 'em!*

*Now, many a true word is spoken in jest . I didn't think so at the time, but he was quite serious. Three weeks later I found myself with a computer magazine to produce. What qualifications did I have? Unashamedly, very few.*

*But I am a professional writer and I have endured the frustration, anger, tear-out-the-hair and kick-the-desk despair of buying a microcomputer and using it in my day-to-day business. During my 18 months of gazing into a monitor, I've spent a small fortune on computer books and magazines. Most of them are gathering dust on the shelf because they're not written in a language I can understand – and that's plain English.*

*I take strong objection to the jargon of the computer world. Where else could an ordinary lead pencil be described as a 'graphics interface unit'; or the eraser on the other end as a 'character delete module'. For crying out loud ...*

*Now the microcomputer is marvellous thing. It's opened up a new way of doing business for me, and for thousands of other Australians , but it hasn't been without heartache – most of it caused by 'low quality interface', which is computerese for muddy communication.*

*It may be a slightly tarnished view, but the computer industry appears terrific at producing the equipment, shows improvement at writing easy-to-use programs, but is generally very ordinary at supplying its novice customers with the information and support they need.*

*That's what we're all about – communicating useful information for those not fluent in the language of the microchip.*

*And, we suspect, that's most people.*

*We're not for computer experts – they've got their own magazines – we're for the first-timer and the curious window shopper. We're here to help avoid some of the pitfalls which lurk, out there, beneath the hi-tech store displays and the jargon.*

*With one or two exceptions, the people who have penned our stories are professional writers, not professional computer people. Every one of them, however, uses a microcomputer to earn his daily bread.*

*So give us a try. You never know, maybe you'll be able to read us without that awful mental fog which characterises the computer buff books.*

*Maybe, just maybe, you'll even find something humorous ... something to smile about.*

*PHIL SCOTT.*

# LEARNING TO DRIVE

Nobody warned me it was going to be this hard. There I was, a child of the twentieth century, a reasonably adept human being who could operate a video recorder, make the stereo play music and even get the motor mower to cough into action. Wasn't that enough technical background to master a microcomputer?

After all, the ads said it was simple. I could "revolutionise my way of life" according to the blurb which promoted one particular box of electronic mystery. Another told me I could "become more efficient". Good oh, thought I, that sounds like a pretty fair sort of deal.

So, on that fine and sunny morning 18 months ago, when the IBM golfball teed off for the last time, there really wasn't a decision to make, was there?

A new electric typewriter was going to cost the best part of $1500. A portable computer was only $2295. For an extra $795 a bloke could computerise his writing business and 'become more efficient', and so on ...

## The First Commandment

It sounds so naive now, but that's the way I viewed the equation. I was about to learn the First Commandment of personal computing – that is, the price you see advertised is *not* what the deal is going to cost. No sir.

Being a rank amateur in these matters, I sought the advice of several friends who had bought micros for work and/or pleasure. There I learned the Second Commandment. Every owner reckons his computer is the greatest thing since sliced bread. It's like buying a car I suppose, if you've bought a lemon, you're not going to tell the world you've been had. It reflects badly, you see. When I think back at some of the crude and nasty equipment I could have bought on friendly recommendation, it's enough to make me cringe.

## Getting The Nod

In some ways I was lucky on that bright and sunny morning. Two phone calls – one to a computer programmer brother of mine, the other to Matt Whelan of *Your Computer* fame – confirmed the unit I wanted to buy was 'a good thing'.

It was an Osborne 1. At $2295, it came with what I thought was all the software I would ever need. Whelan said it was the best business computer value on the market; Programmer Brother said he'd played with one and that the software was good and it had plenty of power (whatever that was).

So I waltzed into the nearest Osborne outlet and asked for a

*There are many things they don't tell you when you buy your first computer. At least that's what our writer found when his geriatric IBM typewriter finally died. Twenty-four hours after it was laid to rest, he was $4000 poorer and had a computer on his desk. It was sink or swim time. In the year and a half since, he's been orphaned, spent a small fortune, learned a lot and still believes the microcomputer is the best thing since sliced bread. Out of all that he's compiled a set of commandments for the first-time buyer. They could save you a lot of time and needless anxiety.*

By Phil Scott

demonstration. The salesman put the Wordstar program through its paces with dazzling precision. For a writer, being able to insert, delete, move whole paragraphs and justify the finished product was a goldplated godsend, manna from heaven. I was sold before he did the SuperCalc spreadsheet demo and began to talk about BASIC programming language. He may as well have talked about Hindustani for all it meant to me. Besides, after Wordstar, I was putty in his hands.

**Wordstar Blinds Journalist**

Of course, I didn't realise it at the time, but I'd just learned the Third Commandment – temper enthusiasm with caution and a big dose of cynicism. Did I stop to think how long it would take me to reach the salesman's level of Wordstar proficiency? No way, I blithely *presumed* (after all, the brochure said it was easy) it might take two, maybe three days.

Then came the inflatable bill. The First Commandment was about to come home to roost.

The Osborne was $2295, but wouldn't sir be using it for five or six hours a day? ... and surely that small screen wouldn't be adequate, would it sir? ... after all, one must look after one's eyes.

So, sir, still flushed with enthusiasm, forked out an extra $322 for a 30 cm amber screen monitor. Then, of course, there was the printer – so blindingly obvious, yet it hadn't entered the mental calculations. So, kiss goodbye to another $1188 and the bill had grown from $2295 to $3815 ... and it wasn't over yet. I'd need a cable to get the printer and computer talking to each other ($85), a box of instruction cassettes and flip charts (about $100 worth of highway robbery), a box of paper for $27 and ten floppy disks at $54.

That's how a $2295 computer can cost $4081. The same way a $495 unit will cost $2000 ...

**The Set Up**

Then, armed with a car full of goodies, I arrived home and commenced to set up the gear. That's where I learned the Fourth Commandment. It might seem elementary, but most buyers don't even consider asking the salesman for a full working demonstration on the equipment they've just bought. That's Commandment # 4 – make sure your unit is functioning perfectly, talking to the printer, reading and writing from the drives properly, *before* you take it home.

Mine wasn't. Somewhere along the line the boys in the store had left out the power cable for the printer. A friend of mine later bought an identical machine, had an identical problem and also found his second disk drive wouldn't operate. Far better to sort those dramas out before you've parted with your money, wouldn't you agree?

The Fifth Commandment arrived with a rush of blood to the head. The Osborne manual was OK, but the printer manual was as easy to read as Idi Amin on a bad day. We had arrived at our first perception interface problem. In other words, I couldn't understand what I was supposed to do.

**You Can Make Them Talk**

The Fifth is simple – don't be intimidated by the salesman's jargon. Don't be afraid to ask him what the hell he's talking about when he prattles on about RAM and running the INSTALL program and patching and all the other stuff. I didn't, probably because human nature won't readily admit to ignorance.

After a few hours I grasped the concept that the computer and printer had to be set up to talk to each other. It was news, believe me.

The only problem was that cursed Japlish technobabble manual. Nowhere within its 50 big format pages could it tell me what type of printer I had bought. Was it a Centronics, a serial, a parallel or what?

The information I needed was devastating in its simplicity, but it was nowhere to be found. This brought proceedings to a grinding halt: proof, where none was needed, that the Fourth (get it working before you take it home) and Fifth (don't be afraid to ask dumb questions) Commandments are absolutely vital for the novice.

It took three weeks, not three days, to get vaguely familiar with the Wordstar program the salesman made look easy. There were times during that three weeks when I would happily have given it away in disgust. But $4000 and a mixture of anger and desperation finally got the thing operational.

**Pigpockets**

That experience gave birth to the Sixth Commandment, which relates to pig-headed stupidity and long pockets.

It says: Seek professional help to learn your business software inside out *before* you try and use it. Manuals are *not* the key to understanding. There is no substitute for hands-on experience. If I'd spent a total of six days attending three courses, I'd have saved six weeks of lost time during that first year. The cost for those three courses – An Introduction to Basic Computing Concepts and Personal Computers, plus both Beginner and Advanced Wordstar tuition – would have set me back $870. That sounds a lot, but what did those six weeks of unproductive time cost me? I'm ▷

sure it was a lot more than $870.

The same applies to businessmen using accounting, inventory, general ledger, financial modelling or database software. Get some professional help. Shell out the tax-deductible dollars and do the course yourself. BASIC programming, which still remains a mystery to me, is also taught at several computer schools. The prices and courses quoted here are those of the Metropolitan Computer College in Sydney – but there are plenty of similar institutions.

Of course, if you're a hobbyist, you can afford to take the slow track and learn as you go. It can be fun – providing your living doesn't depend on it.

### A Bug In The System?

The Sixth Commandment raises a fundamental flaw in the way computer equipment is sold. With most dealers (certainly the one I bought from), you pays your money and takes your chances. They'll happily provide the hardware and software, but as far teaching the buyer how to use it goes ... forget it! Well, almost. If you can find a dealer (and there are a few around) willing to give you the support and training required, then grab him by the lapels and don't let go. He may not be worth his weight in gold, but he's worth doing business with, even if his gear is a few dollars dearer than the same stuff at Honest Abe's Cash and Carry Computer Discounts. A knowledgeable friend on the end of the phone can save hours of frustration, believe me.

The Sixth also raises a basic problem of attitude among first-time computer buyers. Today everything is instant. When you take home an appliance, you expect to plug it in, read the instructions and bingo, you're in business. The idea that a computer might not be *that* easy, seldom enters the mind. Computer ads certainly encourage the concept that it's all a piece of cake.

As you've probably gathered by now, it ain't that simple ... even if you have a burning desire to keep up with the Commodore, as the advertisement says.

You see, learning to drive a computer is at least as difficult as learning to drive a car. It can also be just as much fun, provide just as many benefits and cost just as much money. In fact, the parallels between the automobile and the computer are numerous.

### Karl's Car And The Chip

Consider this. Karl Benz invented the first car in 1885. The silicon chip arrived in the late 1960s. If we equate the car and the computer in terms of years of development, then the computer is where the car was in 1917!

Just to refresh your memory, there were a whole heap more car makers in 1917 than there are today. The motorists of that era were regarded as pioneers, brave and hardy souls who needed a good temperament, a working knowledge of their machinery and boundless enthusiasm.

There were some almighty lemons in 1917. There were also many manufacturers who failed – Argyll, Turner, Thulin and Mors are a few that spring to mind – leaving scores of orphan owners.

The same thing is happening today with the personal computer. When the Osborne Computer Corp crashed in mid '83, I was left an orphan. There are 6000 Osborne owners like me in Australia. And as sure as God made little apples, there will be many thousands more people who buy, only to find months or years later their manufacturer has turned up its corporate toes. It's part of being a pioneer, I guess; but a friend of mine, a computer buyer for a large chain, tells me he'll only touch the B-I-G name hardware these days. As he explains it: "I thought we were as safe as a bank with Osborne, but we got stuck with a heap of stock and we had to sell it off cheap".

Six months after I'd parted with $2295 for an Osborne 1, my writer mates – buoyed by demos at the Scott household – were snapping up orphaned Osbornes for as little as $1500. And you think I wasn't hopping mad!

If you're statistically minded, consider this aside. According to one American source, a new brand of microcomputer came onto the US market once every three days during 1982. How many of those will survive until 1992?

### Half The Rhetoric – The Believable

The Seventh Commandment is the result of 18 months accumulated cynicism. The Seventh says: believe half of what you are told. Here are some examples:

■ *Yessir, this computer, this program is user-friendly.* Most of them are user-downright-bloody-difficult.

■ *Yessir, this computer is IBM-compatible.* Challenge the guy who tells you this to load an IBM software program into the machine and operate it through every function. Plenty of 'IBM compatible' machines won't respond. Others will read some programs and develop a case of amnesia with others. There are some things you need to check. First, does it run the same disk operating system (that is CP/M 86 and/or MS-DOS)? Second, does its version of BASIC parlay with the IBM version? Finally, does it have identical accessory slots, use a keyboard with the same programmable function keys, and was it really designed to run IBM software?

■ *Yessir, for $299 you get a great computer.* Refer the First Commandment.

■ *Yessir, there's heaps of software for this computer.* Ask your dealer for a complete list with prices and supplier telephone numbers. Then, categorise the software into three groups – business, recreational or educational. There may well be 'heaps' of software, but unless it's one of the Biggies (read IBM or Apple) it's likely to be concentrated in one area.

■ *Yessir, of course you're covered by a FULL WARRANTY.* Sure, for how long. Most warranties only cover the first 90 days – hardly satisfactory for a high-cost piece of equipment. Does the warranty cover *all* the equipment you bought, is the software included, is there a free replacement or loan clause?

■ *Communications sir? No problem!* I spent six months and $500 getting my computer talking to the mainframes of two publishing houses, when the salesman had assured me it was a snack. Ask for a demo. Get him to communicate with the Mi-Computer Club Bulletin Board for example. If he can't organise that, then it ain't no snack.

There are probably three more Commandments to go with the seven outlined here, but just at the moment I can't dredge them out of my Random Access Memory.

And lest you think this story was overly tinged with bad news, oh dear and gentle reader, I apologise.

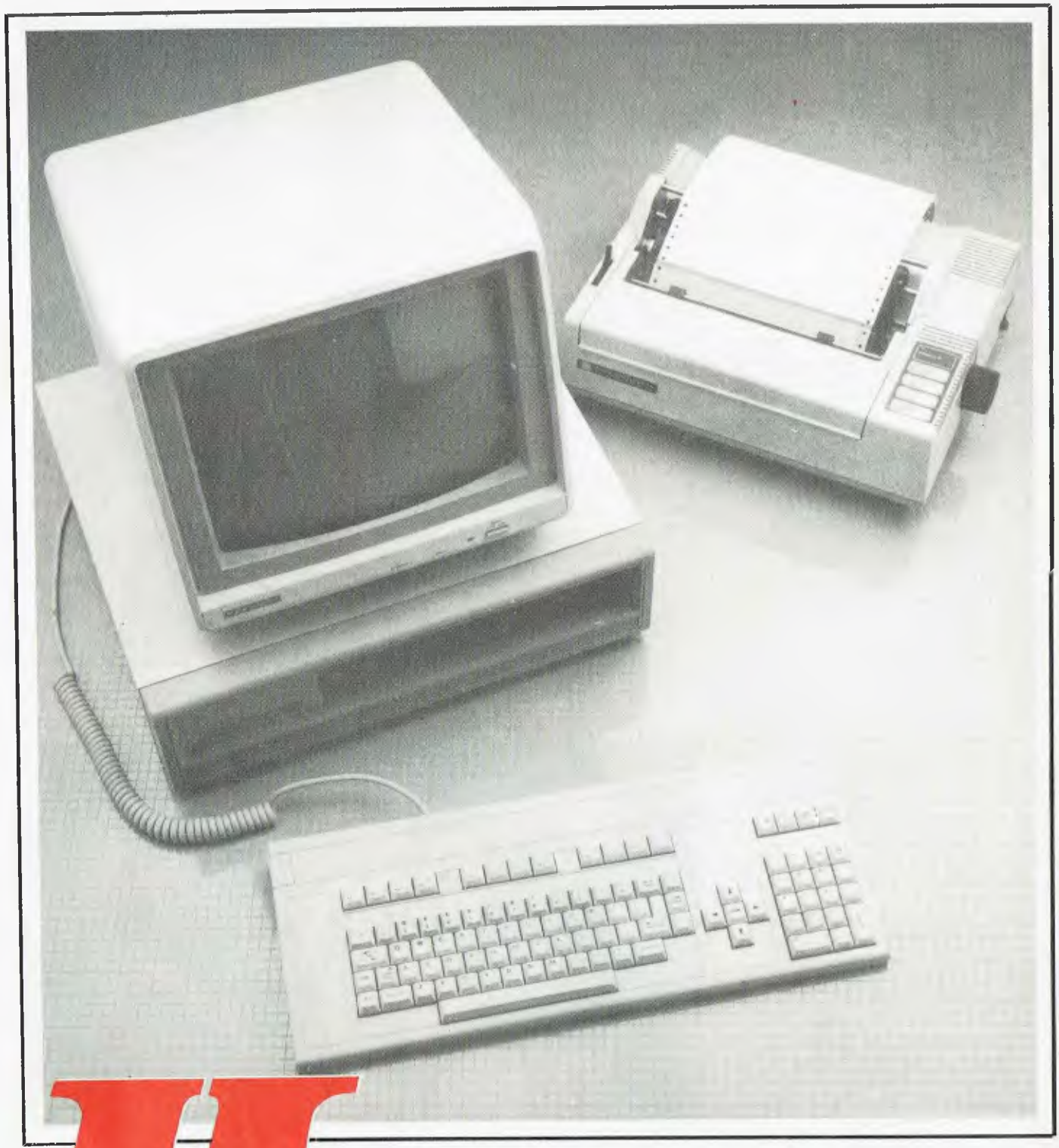
Buying my now-orphaned Osborne has improved my productivity by at least 35 per cent. I'm writing more words, faster. And (believe it or not) the end result is much better polished, because editing is easier.

In fact, so smitten am I with the benefits of the microchip that I have just signed $6500 worth of paper, which will shortly see a new hard-disk Morrow MD-11 computer delivered to my doorstep.

It will, no doubt, prove to be as bitter-sweet an experience as my last 18 months with the Osborne.

But through it all, I shall remember the words of the late John F. Kennedy, who said:

"However extraordinary computers may be, we are still ahead of them. Man is still the most extraordinary computer of them all..." ❑



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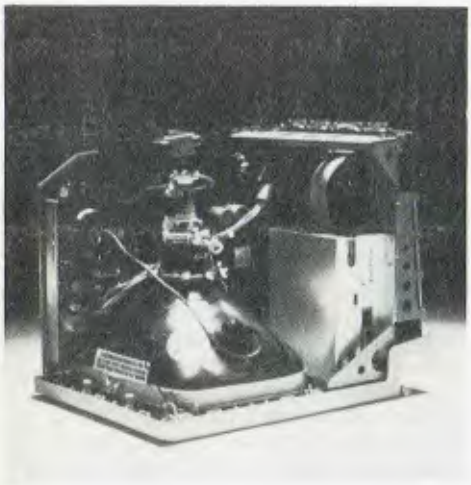


*An insider's view of the Apple IIc monitor.*

*Computers may not be magic, but they can sure seem that way. They're also intimidating. All that technojargon and computer gobbledy-gook about binary numbers, BIOS, bits and soft sectors is enough to make your head hurt. This introductory article lets you forget all that. Even if it's the only piece you ever read about computers, it will give you a broad understanding of what lurks inside their little silicon hearts.*

**By Chris Gable**

It was Albert Einstein who said imagination is more important than knowledge. Yet, believe it or not, that miracle of the modern era, that idolised, canonised, feared, revered and totally misunderstood device known as The Computer ... has neither. No imagination. No knowledge. Not a bean!

The qualities to which old Albert alluded are as foreign to The Computer as they are to a pop-up toaster or microwave oven. And yet we don't scratch our heads in collective awe when the singed bread emerges for brekky. Or when the cooked chook appears at dinner time.

Part of the myth of the personal computer (or any computer, for that matter) concerns its ability to 'think'. Many folk have a hazy notion that computers have initiative and imagination. Such a misconception is entirely understandable; a logical conclusion in fact, given the barrage of slick advertisements, the mountain of words written and

# "Isn't that the stuff from Mitre 10?"

# HARDWARE:

spoken about this box full of electronic wizardry and its associated bits, bytes and buzzwords.

But let us begin by setting the record straight.

People, ordinary and not so ordinary members of that intractable breed called homo sapiens, supply the initiative, imagination and knowledge.

The computer processes it. Albeit at blinding, scarcely comprehensible speeds which reduce hours of human labour into fractions of a second. But processing data is all it does.

Let's take a look at the various bits and pieces which make up The Computer.

### Hardware's Not Hard To Understand

Computer hardware is not the stuff you buy from Mitre 10 on a Saturday morning. Yet the term 'hardware' is just as logically applied to a $10,000 microcomputer as it is to a $4.99 hammer. Both are tangible, touchable tools. Both are h-a-r-dware.

Forget the jingoistic nonsense of the computer trade and remember a simple definition ... hardware is the stuff you can touch.

It's the central processor unit, the keyboard, monitor, printer, disk drives ... all the things people embracingly call The Computer.

It is not to be feared, for without electricity this wondrous tool is about as fearsome as an unplugged washing machine; as useful as a video recorder that's on the blink.

A computer without its power source and its software is an expensive, dumb machine – no matter what those glossy high-tech brochures lead you to believe.

### Software – The Brains Of The Operation

What is software?

Here we have another example of computerese muddling the Queen's English. Software is a set of instructions (man-made instructions) which tells the computer what tasks to perform. It's a program, by any other name. The tasks it controls can be anything from generating graphics for a video game to rearranging words for this story.

Computers are house-sized or lap-sized, mainframe, mini, micro, desktop, portable or transportable. They are machines totally reliant on electricity, either from a wall socket, a battery pack, or in the case of the new hand-held computers, disposable penlight batteries.

They are also totally reliant on software programs (or instructions); and a human who will load those programs and instruct the computer to use its in-built rapid-fire mathematical ability to calculate and 'process' information.

The same applies when you set a washing machine to wash, rinse and dry clothes; when you cook a meal in a microwave oven; or set up your video machine to record a late-night television show while you're out. You instruct these machines to do the things you want them to do.

The difference between these everyday appliances and a computer is that a computer is capable of being programmed. In other words, with training, you can program a computer to perform specific functions for you. There are even programs which teach you how to program (and to type, if you can't already).

You might use a simple piece of software, like a game which tests your reaction times, or an electronic balance sheet which keeps tabs on your household budget. But any program you devise for a computer, or buy for a computer, is an individual set of instructions which makes it perform a specified function for you. That function might be related to financial accounting, juggling words, computerised filing, or involving you in a tooth-and-nail game which challenges the mental acuity and physical reflexes.

The computer is truly a multi-function machine with applications limited only by man's imagination.

Its usefulness also lies in the fact that a computer produces data based solely on your input. Its decisions are purely logical and unemotional. Decisions made by humans, however disciplined, usually incorporate emotional considerations.

With the help of software and the logical steps on which a computer operates, truly rational, logical decisions can be made about facts and figures, words and diagrams – often in seconds.

Let's take a short walk through some of the fundamentals. They'll all be dealt with in detail in succeeding stories, but an understanding of how they interlink is more than just helpful – it's essential.

### Software First, Hardware Second

It is an adage of personal computing that you should shop for software before you buy a computer. When you've found the software that will help you best with your financial budgeting, spread-sheeting, word-processing, entertainment, graphics generating, or whatever, you then buy the hardware which best runs the software you need. There are arguments for and against this rationale, but hopefully industry moves towards compatibility of computers and software are broadening buyer options. In 1984, millions of computers – the product of the fastest-growing technology in history – are useless when confronted with software which happily runs other computers. In a year, or maybe two, that number of 'uncompatible computer/software' systems will shrink, but by what percentage not even the silicon chip gurus are willing to hazard a guess. Accurate predictions about the personal computer industry, they say, aren't worth trying to make because the technology moves so quickly.

Meanwhile, a program that works well on Brand X, simply won't operate on Brand Y. It's rather like the record industry putting out albums that all play at different speeds – 26.5 rpm for one, 37.3 rpm for another, and so on.

Another argument against the software-before-hardware rule is that people who become reasonably proficient with their computers tend to outgrow their software, or at least look at adding to it, making it even more useful for their purposes. Generally, though, the software-before-hardware adage holds true.

We'll help you with buyer infor-

mation after we've armed you with some guide ropes.

Bearing in mind software is essential to the hazy concept people have of computers thinking for themselves, we'll move from it (for the moment) to talk about the hard stuff, the computer and its peripherals.

Most people don't bother writing their own computer programs because they're happy with the purpose-made software available off the shelf. The range is immense. The ability to manipulate those off-the-shelf programs to accept new instructions and thus perform new tasks gives a computer an extra dimension: one which makes it both immensely useful and hopelessly misunderstood. It also separates the computer from the hundreds of other 'programmable' machines available to us in an age where technological goodies abound.

## A Potted History

The first electronic computers were enormous. The British used huge valves to build a special purpose computer which cracked Germany's codes during World War II. The Americans elaborated on the concept, in 1944, with the first all-purpose computer. Called ENIAC (Electronic Numerical Instigator and Calculator), the machine cost millions of dollars and was less powerful than most modern lap computers.

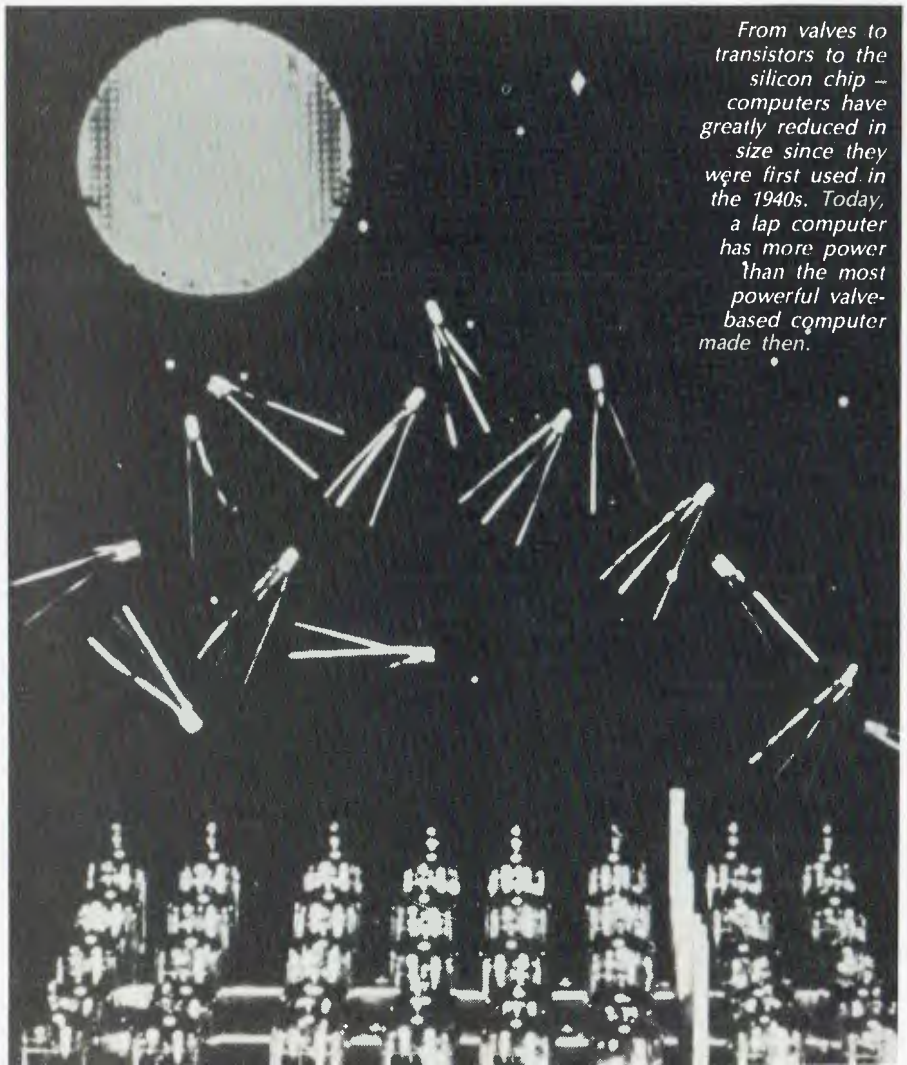
Programming ENIAC to get it to do anything other than its normal calculations meant re-wiring the machine. The American mathematician Jon van Neuman soon introduced a method of storing programs which allowed them to be fed into a computer whenever they were needed. The computer wouldn't have to be re-wired to answer variations on a standard program and a programmer wouldn't have to type a new set of instructions into the computer every morning. The advent of the stored program also meant information could be accessed in seconds from anywhere on the program.

The development of the transistor brought reduced hardware size and some reduction in price. But the real leap in computer technology came in 1959, when America announced its plan to put a man on the moon. The silicon chip, one of the important technologies to emanate from the man on the moon project, compressed thousands of miniscule transistors and electrical circuits into a finger-nail-sized piece of one of the world's most common materials. Both the physical size of computers and their price plummetted – while their capabilities were vastly improved. Each chip did the work of thousands of transistors.

The world of the computer – the mind-boggling world of science the man in the street had seen, read and heard about, most recently in relation to banks, bills and loan repayments – suddenly became the world of the microcomputer. With the advent of the term 'micro' came a new prefix to the word computer it was, of course, 'personal'. The personal computer has given access to people who never imagined they'd be able to use The Computer to look after their budget, make their typewriter obsolete, or involve them in ultra-sophisticated games. As prices of personal microcomputers fall and their use becomes even more simplified (a quality referred to in computer jargon as 'user friendliness'), so their popularity grows. But how do they work?

You'll find the internals of the microcomputer explained in a companion piece to this story (along with how it 'reads' and 'writes' information for you). So we'll concern ourselves here with the physical aspects of microcomputers – desktop, portable, transportable and lap microcomputers – and their often necessary add-ons, known in computerese as 'peripherals'. Golly that sounds impressive!

Desktop computers are a world apart from ENIAC, which would ▷



*From valves to transistors to the silicon chip – computers have greatly reduced in size since they were first used in the 1940s. Today, a lap computer has more power than the most powerful valve-based computer made then.*

have filled a good-sized house, yet they are easily as powerful. The term 'desktop' refers to the fact that the microcomputer and its peripherals are usually set up, semi-permanently, on a desktop or in a computer 'work station' (an area designed to house the computer, its peripherals, working reference material and, of course, a chair for the computer operator).

Among the most popular desktop microcomputers for business applications are IBM's PC, the Apple II and its variants, and NEC's APC. But there are literally scores of other brands, all offering slightly different dollar to performance ratios – which is why we compiled a guide to systems in this magazine. The hundreds of 'games' computers can also be grouped with the desktop units for the purpose of definition. While the minority of desktop micros require a separate monitor (most have one included as part of the system), it's the other way around for most games computers which need to be plugged into some sort of monitor – usually an everyday television screen.

**Portables And Transportables**

The term 'transportable' has only recently been applied to microcomputers which were once considered 'portables'. These are microcomputers like the Osborne, Kaypro, and others; which incorporate computer, disk drives, keyboard and screen in a single case (at least one US manufacturer also includes a printer in the case). The microcomputer and its disk drives usually make up the bulk of the carrying case, with the keyboard folding out for use and locking back into place for transporting. Some brands offer an optional battery pack for use in places where you won't find a power outlet (or where power outlets don't use the AC electrical grounding specified by the manufacturer).

The micros we called 'portables' 18 months ago have become *trans*portables today – because small 'lap' computers from manufacturers like NEC, Hewlett-Packard, Tandy and Olivetti have usurped the 'portable' name tag.

These smaller-than-ever machines store an impressive amount of information, contain three or four permanent internal software packages (for accounting, word processing and so on) and can keep user-entered data for months. The new portables are disposable-battery powered and incorporate a screen which in some cases displays eight lines of type, numbers or symbols. Some even have a printer. Generally, there are some trade-offs with the new portables, but their small size gives them obvious advantages over microcomputers you can't use on an aeroplane, in a train or bus, or in the back seat of your chauffeured limo.

**The Key to Success**

A microcomputer has a keyboard (usually a conventional typewriter keyboard) which incorporates a numeric pad, or pocket calculator-type layout, and several special function keys.

Surprisingly enough, the keyboard is one of the most expensive components in the manufacture of a microcomputer. A moving keyboard uses switches under each key which, when pressed, close to complete a circuit. The completed circuit relays specific electrical impulses to the computer.

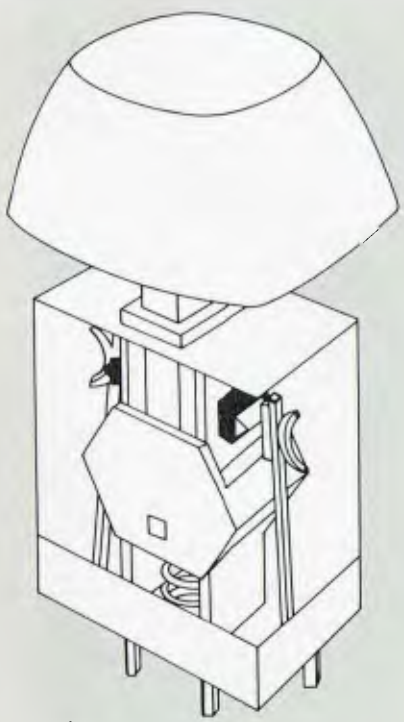
'Touch-sensitive' keyboards are less expensive to manufacture and are therefore becoming more popular. Keyboard users who switch to a touch-sensitive system sometimes complain that they don't have the same feel as a moving keyboard. The touch-sensitive version is flat and characters are typed by merely touching their symbol. An audible beep usually sounds to confirm that you have pressed a character.

Another type of keyboard uses a single rubber membrane which incorporates the keys. The elasticity of the rubber causes each key to pop back up after you've pressed it.

Midway between the two systems

**THE KEYSWITCH**

Typewriter-style keyswitches tend to incorporate a pair of contacts normally held apart, which means that no current flows between them. When the key is pressed, a plastic moulding moves down, bringing the contacts together and closing the circuit, which of course causes current to flow. The wires connected to the contacts in each switch are arranged in a grid and the computer works out which key has been depressed by checking which of the vertical wires on the grid and which of the horizontal wires is conducting the current. Although keys of this type are mechanically complex and more costly to manufacture, they are reliable and have a better 'feel' than rubber membrange keys, because each key is provided with a spring to return it to its normal 'up' position and this spring provides some resistance when pressed. If the key is well-designed, the user can use this resistance to judge whether the key has been pressed properly. Sculpted tops also provide move comfortable typing, and as a whole, keyboards with this type of action are a better choice if use is going to be extensive.



is a 'calculator-style' keyboard which has more tactile feel than a touch-sensitive unit, but without the shape of traditional keys on a typewriter. The keys are more like those on a pocket calculator, but can be used fairly quickly by a competent typist.

Why so much detail on a seemingly insignificant subject like keyboards? Simply because the keyboard is the operator's main link with the computer.

For a writer, who spends six or seven hours a day tapping out words, keyboard 'feel' is of great import. The same applies to the accounts person who punches in string after string of numbers. The moral of the story is, try before you buy.

Most microcomputers still require you to type out commands, or abbreviations of commands, to operate the computer or to program it. Some keyboards use specific keys to relay often-used commands. For example, some keyboards have BASIC language keys, with commands like PRINT, GOTO (sounds daunting, but only means 'go to') and INPUT being entered using a single key.

Information is fed into a computer via the keyboard, a computer games joystick, track ball roller, or a touch pad or similar device.

### Feeding In The Programs

Programs and stored information are fed into the computer via a cassette recorder (for cassettes), disk drives (for floppy disks), or hard disk drives (for hard disks). On a price scale, cassettes easily come first, followed by disk drives and, most expensive of all, a hard disk drive. A hard disk drive can cost as much as a microcomputer.

The computer operator uses the information contained on the cassette or disk to process words or data, play elaborate electronic games or write programs which will vary the computer's tasks.

Cassette recorders are mainly used on games-based computers, though cassette programs are also available for business applications and word processing.

Floppy disks (or diskettes) are faster to use than cassettes, can store more information and inevitably cost more money.

Some microcomputers (usually the transportables) have two disk drives built into the 'dashboard' of the computer, while others have either a single disk drive, a dual disk drive, or two single disk drive units as peripherals.

Most desktop business machines are capable of running a hard disk system if mass data storage is required. It's probably not the best analogy, but if a floppy disk was the equivalent of a 45 rpm record, then a hard disk would be a whole library of LPs.

Disk drives produce the 'whirring' sound which people readily associate with computers. Some disk drives are noisier than others and can become even more so when moved from the busy computer showroom into your study or onto the dining room table.

### Putting It On Paper

The second sound most associated with computers is that of a printer grinding out hard copies. The high-pitched buzz of a dot matrix printer gives some indication of its speed. As the names implies, the dot matrix prints out a series of tiny dots which form characters and numbers, much as a newspaper photograph is made up of a dot 'screen'. The dots are punched onto a ribbon, and print words, numbers or symbols at the rate of around 100 characters per second or more (at least that's the manufacturer's claim).

Dot matrix printers have speed, but they can't match the character quality of words, numbers and symbols printed on a daisywheel, or letter quality, printer.

The daisywheel, as you'd expect with a name like that, uses a wheel with raised characters on spokes ▷

radiating from the hub – much as a golfball typewriter punches out raised characters. Typestyles can be altered by changing the daisywheel, much as you change an electric typewriter golfball. A daisywheel also puts its characters on paper by punching a ribbon, but at speeds which can vary from 14 characters per second to around 60 characters per second – slow by dot matrix standards.

Daisywheel printers are more expensive than the dot matrix types, and are used where presentation is important.

Ribbons on both styles of printer are usually cartridge-style, for easy replacement. Daisywheels (and Spinwriters) themselves are also easily replaced, to vary type styles and sizes. Most popular sizes are 9 point and 10 point, and type styles range from Pica through Script, Prestige, Italic and more.

Dot matrix printers come in two main varieties, depending on the number of dots which make up a printed character. The most popular variety uses characters which are made up of blocks of eight lines, each containing eight dots. A higher number of dots means better print quality.

### Putting It On The Big Screen

The last essential for most computer systems is the monitor (cathode ray tube, in computerese, or CRT). As we've mentioned, for those systems without an in-built screen, you can use a television set. For extended use, a purpose-built monitor offers better clarity and less wear and tear on the operator's eyes.

Monitors are sold with either green or amber displays, which means the characters you type on the screen are green or amber (the latter being said to be easier on the eyes). And, of course, there are colour monitors (RGBs, for 'red, green and blue' in computerese) for micros capable of generating colour graphics and coloured scenarios for arcade-style games.

Like dot matrix printers, computer screens and monitors use a matrix system to display characters. The higher the number of dots used to make up a single character determines the resolution (or sharpness) of the characters. A 7 by 9 matrix, usually found on monitors capable of displaying 80 columns of characters, is said to relieve eyestrain.

### More Optional Extras

Anti-spike devices are vital if electrical current to the microcomputer is likely to be interrupted, even momentarily, by 'spikes'. Electrical current spikes can be heard as crackles on radio, hi-fi or television speakers when another electrical appliance in the house switches on or off.

Other peripheral devices feed constant electrical current to a microcomputer in the event of 'brownouts' (temporary electricity supply problems in which house or office lights dim) and blackouts. Electrical storms are culprits in both brownouts and blackouts.

These options can become essentials because an electricity supply brownout or blackout can instantly wipe out your work.

It's about now that the personal microcomputer equation becomes more difficult.

You can process words and data on a computer which has either one or two disk drives – either built-in to the computer or interfaced (connected) from alongside the computer – and either a built-in or external monitor. A printer is required if you want a 'hard copy' of your work. (Some people, such as writers, accountants and other professionals, consider a printer a necessity.)

The microcomputer system equation gets more difficult partly because it starts to get more expensive.

The add-ons (or peripherals) become more enticing. Again, some will be necessities for professionals. Cassette-based games computers can require coloured monitors and elaborations on the joystick theme – where the player guides a car/jet/spacecraft using an aeroplane-style joystick.

For disk drive microcomputers, the most popular peripherals after an extra disk drive (if the computer is only sold with one disk drive) are a buffer and a modem.

Buffers look like disk drive units, but they store data from the computer and pass it to the printer. Their beauty lies in the fact that a computer can be used while the buffer's memory controls the printer. Rather than sitting and waiting while the computer communicates with the printer through its multi-coloured flat cable, the computer operator is free to work while the buffer communicates with the printer. If time is money, a buffer has to come into the equation.

### Of Mice ... And Modems

The same applies to telecommunications modems. A modem allows your computer to communicate with another computer – either receiving or passing on information. The modem links the computer to the telephone and lets you send and receive information over the phone. Lengthy, urgent reports can be sent across town, interstate, across the country or internationally – at telephone rates and at telephone speed.

Information from local and international data banks can be acquired by telephone in minutes, again at telephone rates plus a fee charged by the data bank.

Then there is the mouse (a device which gives the operator more freedom of movement around the screen of the computer's monitor and allows him to 'draw' lines and 'paint' in graphics work); the touch pad (which performs similarly); the light pen (a pen-shaped device which 'reads' from the monitor when you 'draw' over words, numbers or symbols); the voice synthesiser; and more.

The bottom line of all this desirable technology is that a modern microcomputer becomes outdated almost immediately you buy it (just as a set of encyclopaedias is outdated the day after it is printed).

Microcomputer versatility is increasing with every new model. The coming laser disk already promises more megabytes of memory (relax, we'll explain that later) than even the best hard disks can offer. Microcomputers themselves

are getting smaller and even more sophisticated – some having in-built software and work storage capability.

The best you can do when buying a personal microcomputer is to buy the most powerful computer you can afford to run the programs you want it to run. You should consider the peripherals you'll need to complete your system – whether you buy them with the computer or plan on adding them later as you can afford them.

## Drive Before You Buy

Like driving a demonstrator car, you should 'drive' hardware before you buy. A hands-on demonstration at a computer shop is always illuminating, no matter how limited your experience with computers. A good salesperson should be able to recommend and run a program to your stated requirements. If the salesperson can't demonstrate the computer and the program to your satisfaction, go elsewhere.

*When the hand-held mouse is moved across the desktop a pointer moves across the computer screen, allowing the user to point to graphic symbols or instructions and activate them by pressing the button on the mouse.*

If you're impressed by the first personal microcomputer you see, don't buy it. Everybody is impressed by their first microcomputer demonstration. Everything seems perfect. Keep calm and continually reassess your requirements and your possible needs. If you decide you don't need sophisticated, high-resolution colour graphics and extensive memory, look seriously at some of the very cheap (and very impressive) microcomputers. Most of them have the capacity for expandable memory using yet another peripheral, a memory card. This little gizmo plugs into the computer's innards and can double (or even treble) the memory capacity, which is expressed in Ks (for Kilobyte).

The important thing to remember about buying memory is that you'll need enough to accommodate the software you intend to use. A complicated word processing program, like the one this story was written with, takes up around 40,000-50,000 computer bytes ( or 40K-50K in computerese). Thus, it would be pretty silly to buy a computer with only 16K of memory. If you're still confused about Ks and bytes ... relax, and all will be revealed a few pages further on.

A service contract through your dealer is highly recommended. The contract usually entails up-front payment of a fee which guarantees you quick servicing and repairs of your computer. With shameful 90-day warranties as the industry standard, it takes a brave buyer indeed to step out into the micro-world without the security blanket of a service agreement.

With a microcomputer, the right peripherals and software you're ready to do what Albert Einstein said so eloquently – explore your imagination ... and expand your knowledge.

But don't let anyone tell you it will be easy. Becoming proficient on a microcomputer is probably harder than learning to drive an interstate truck. You're not going to pick it up in 20 minutes ... ❑

# ADSPECS

Before you pay out your money, you want to make sure your chosen microcomputer will do the job. Like cars, some microcomputers will do the job better than others, even faster than others. Also like cars, some microcomputers will be more powerful than you might need; you wouldn't buy a Lamborghini if your daily drive took you to the local railway station, or to the supermarket, and back.

Specification sheets describe the things that really matter in a car or a microcomputer. Other considerations – such as appearance, manufacturer, price and after-sales service – should be made after you've studied the spec sheet.

### Don't Overdo It

Microcomputer systems specifications are a lot like car specifications. You should have a pretty good idea of your needs before you investigate either. If the car/computer you can afford has some advanced features you feel you mightn't need just yet but might need in the future, well and good. But be wary of over-reaching your budget: an expensive microcomputer system might have features you'll never need.

You should have a pretty good idea of your broad requirements; that is, you'll know if you need a printer, a monitor, maybe facilities for electronic communications (sending or receiving information via the telephone), a cassette system, disk drive units, joysticks, or any of the other available pieces of microcomputer hardware.

What you probably won't know just yet is how 'powerful' a computer has to be to meet your needs. Nothing beats advice from a person who has similar computer requirements as your own and who already owns a computer. But bear in mind that human nature is unpredictable. You should know a person pretty well before you jump wholeheartedly onto their bandwagon. Research into car buyers shows many people won't admit to inherent problems with their car because they don't want their complaints to reflect badly on their ability to choose. You should ask for specific demonstrations from salesman or friend, alike.

But the bottom line in choosing a microcomputer is the specification sheet. When you no longer fear its mysteries you're ready to more fully assess your perceived needs and the swag of advice coming from books, brochures, magazines, salesmen, associates and friends.

Our basic system specification sheet should get you started; the following breakdown might help you on your way.

### Standard Hardware Features

You should already know about CPUs (Central Processing Units) and you should also recognise that the Z80A CPU listed in our specification sheet is one of several commercially-made CPUs. The Z80A CPU is one of the most common types of microprocessors found in microcomputers and is made by the Zilog Corporation. Yes, you're right, it is American-made.

The *primary clock* (as opposed to a real-time, or 24-hour clock) is virtually a stopwatch which times the CPU's lightning-fast operations. Each operation is performed by the CPU to the dictates of the primary clock. In this case, the primary clock can measure as accurately as four million times a second (4 MHz).

The *Data Word Width* refers to the number of ones and zeros (remember the Morse Code analogy from the article about how a microcomputer reads, writes and remembers) that make up each unit of information used by the CPU. In this case, the CPU uses eight *bits* – or ones and zeros – to make up a unit of information (an alphabet letter, number, keyboard or graphic symbol).

Each group of eight bits is a *byte* and the capability of a microcomputer to store, read and write information is referred to as *kilobytes* or *K*s of RAM and ROM memory. A kilobyte is made up of 1024 bytes and a microcomputer like the one in our specification sheet will have 64K of RAM memory – or user-programmable memory – in each of its two disk drives.

### Wanna Big Bit?

More powerful microcomputers can contain 16-bit or even 32-bit data word width microprocessors. They can also have RAM memory storage capacities measured in *megabytes* (thousands of kilobytes). One of the great advantages of hard disk drive units is their ability to store megabytes (or Mbytes). Hard disk drive systems start with about five Mbytes of storage capacity and move up to 10 Mbytes, 15 Mbytes, 20 Mbytes and so on. That kind of storage capacity is impressive – and expensive.

Our computer has 16K of ROM, or read-only memory – memory which is pre-programmed and remains in the machine permanently. The CPU can read from the ROM memory and will retain that memory – which can contain the computer's Disk Operating System (DOS), or a BASIC language interpreter, and start-up and self-checking procedures. The ROM memory stays in the microcomputer even when its power supply is off. RAM memory can only be used while the computer is switched on, but can be stored on cassette, floppy disk or hard disk (depending on the type of microcomputer).

### Nano, Nano

The microcomputer in our specification sheet takes 300 nanoseconds (or millionths of a second) to call up information stored in its ROM memory, and 200 nanoseconds to read and write onto and from its RAM memory.

To understand double- and single-

*Watered down system specifications aren't nearly as daunting as they might first seem. In fact, they are your most useful tool when shopping for a computer, because they're down on paper and must be truthful.*

**By Chris Gable**

density disk drives and diskettes, you have to appreciate that information is stored on disk in circles called *tracks*.

Unlike hi-fi records, on which the tracks spiral towards the centre, each disk track is divided into sectors. A disk drive unit which compresses twice as many tracks onto a disk, is a *double-density* disk drive, and the disk is a *single-sided, double-density* disk.

### Double-Talking Heads

When a disk drive unit has *read/write heads* on both sides, it uses *double-sided, double-density* disks, which obviously store more information than either single-sided, single-density disks or single-sided, double-density disks.

In computing, *ports* aren't something men have with cigars after dinner, but rather connection adaptors for specific types of hardware which are external to the microcomputer itself.

The Motorola 6821 PIA port is the *interface* to which the IEEE-488 (Institute of Electrical and Electronic Engineers standard) connector is fitted. This connector and its PIA (Parallel Interface Adaptor) port is the channel through which the microcomputer connects to printers and other hardware devices via a multi-wired cable.

### Under Control

The *controls* section of the specification sheet is fairly self-explanatory. If additional keys (as in typewriter-keyboard keys) are listed, their functions should also be listed. Some microcomputer specifications will mention other functions of the keys – as in the various Sinclair computers, on which single keys can be depressed to perform BASIC programming functions.

The Reset button is a button that wipes the RAM memory from the microcomputer – unless it has been stored on cassette, floppy disk or hard disk – and enables you to restart the machine as if you had just switched it on. The Reset button works much like the 'Clear' button on a pocket calculator.

The *Display* section of the specification sheet refers to ASCII characters, which are part of the American Standard Code for Information Interchange character set. The ASCII characters are a standard coding method for computer representation of numbers, letters and characters.

The '25 rows each with 80 character positions' refers to the number of lines displayed on any one screen, each line capable of being 80 characters wide. The size of the display can be important to people who want to work with financial spreadsheets, graphics and even word processing.

### Eye Resolve

The '8-by-10 dot matrix for each character cell' in our specifications refers to the *resolution*, or sharpness, of each character as it is represented on a microcomputer screen. An 8-by-10 dot matrix is the size of the *dot square* which makes up one character on the computer screen. A 5-by-7 dot matrix is said to be the minimum resolution acceptable to your eyes.

Again, the 'Disk Drives' section of the specification sheet should be self-explanatory. Half-height drives are just that – only half the height of conventional disk drive units.

*Seek Time* refers to the time it takes for the mechanism of the read/write heads to move to the correct track of data. Similarly, the *Average Rotational Speed* refers to the time taken by the disk drive to rotate a floppy disk from one track to another.

'Formats supported' explains the

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Computer System Specification Information is what buying a personal microcomputer is all about. Once you've come to grips with the concept of the microcomputer and its peripherals, you're ready to investigate the potential of computer hardware.

We've drawn up a simple set of microcomputer specifications, to show you how hardware concepts are shown on a system specification sheet. (The information is plucked from a variety of microcomputer specification sheets, rather than from a specific computer.)

**Standard Hardware Features**

- Z80A CPU, 4 MHz primary clock
- Data word width: 8 bits
- 128K RAM
- 16K ROM
- ROM cycle time: 300 ns (nanoseconds, or millionths of a second)
- RAM cycle time: 200 ns
- Two double-density disk drives: 220K capacity each

**Ports**

- Motorola 6821 PIA (Parallel Interface Adaptor) IEEE-488 may be configured as Centronics-type port (that is, for printer)
- Z80A SIO/2

**Controls**

- 69-key detachable keyboard, including 12-key numeric keypad
- RESET push button on front panel
- Power On/Off switch on front panel

**Display**

- ASCII character set 25 rows each with 80 character positions, outputs to domestic TV and monitor
- 8-by-10 dot matrix for each character cell

**Disk Drives**

- Two half-height drives per unit
- Media: 13 cm double-density, soft- sectored
- Formats supported:

Osborne, single- or double-density
IBM-PC (CP/M 86)
DEC VT180
Xerox 820-1, single-density
Cromemco mini-disk
UCSD p-System Universal Format

- Seek time: 20 milliseconds, track to track
- Average rotational speed: 200 milliseconds +/- 2%

**Graphics**

- Teletext and viewdata compatible.

**Sound**

- Music synthesizer, 5 octaves, hi-fi output

**BASIC**

- Sound and graphics commands, error messages, screen dump, syntax check, structured features

**Languages Available**

- Pascal, COBOL, FORTH, LOGO, PROLOG, Assembler, LISP. ❑

microcomputer formats which can be used by the computer. The number of formats supported also has a strong bearing on the variety of software which can be used on the microcomputer.

### The Tele-View From Here

*Teletext* and *Viewdata* are terms which are used to describe the broadcast of text and graphics. Teletext refers to text and graphics broadcast as part of a television video signal, while Viewdata refers to text and graphics usually generated via telephone lines.

Sound capabilities will impress people who want to use their computer as a music synthesiser. Our sample computer has the ability to reproduce five octaves which can be channelled through a hi-fi unit.

The 'BASIC' capabilities of the microcomputer describe just that – the jobs which the in-built BASIC program in ROM memory can perform. Sound and graphic commands are self-explanatory. Error messages are there to tell you when something is wrong with the input into the computer. *Screen dump* refers to the ability of the computer to transfer data or graphics images from the computer display screen to a peripheral device, such as a *buffer*, which holds the information and passes it into the printer while you continue working at the computer keyboard. *Syntax check* checks the structure of programming input to see that it follows BASIC programming rules.

'Structured features' simplify the functions associated with computer programming and help in such areas as designing, testing and debugging programs.

### Gobbledygook

'Languages available' refers to the computer languages which can be used on the microcomputer in question. All the languages mentioned in our sample specification sheet would take a lifetime to learn, but people who intend designing their own programs would use one or more of these programs in preference to BASIC.

And that, ladies and gentlemen, is a spec sheet explained. ❑

## A GUIDING QUESTIONNAIRE

The essentials of buying hardware are that it must be compatible with the software you intend to buy; and it must have the memory size, storage capacity, printing features and communications ability that suit your application. Then there are the less obvious areas of documentation, warranty, service, support and the price of add-on features you may need as your applications expand. This 30-minute guide to 'Buying Hardware' was originally prepared by Coopers & Lybrand for the small businessman. It makes powerful sense for *any* first time buyer.

The following series of questions will guide you towards matching your needs against the equipment features. When you look at a microcomputer, take this guide with you and check off the items as you go.

### Operating System

- Which operating systems can your software work with?
- Which operating systems can run on the microcomputer you are considering?
- Is there a large number of different programs available for the operating system you are considering?

### Disk Storage

- Are the software packages you intend to purchase available in a diskette size and recording format that agrees with the diskette drives that come with the microcomputer?
- How many diskettes will it take to hold your largest file?
- How many diskette drives can be added to the microcomputer?
- How many hard disks can be connected to this microcomputer?

### Internal Memory

- How much memory is required for the application package (that is, the software)?
- How much memory will be used by the data?
- How much memory comes with the microcomputer?
- How much memory is available for use by application programs?
- How much additional memory can be added?

### Keyboard

- Is there a numeric keypad?
- Are any special characters or foreign alphabets you may need available?
- Has the main user of the system evaluated the keyboard for placement and touch?
- Is the keyboard detachable?
- Are there programmable function keys that work with the software you have chosen?

### Monitor

- Do you need 80 or 132 characters visible across the screen?
- Has the main user checked the screen to establish that the characters are clear and easy to read?.
- Do you need a colour monitor?
- Does the colour (white, green or amber) of the letter on the screen make a difference?
- Can the microcomputer handle more than one monitor simultaneously?
- Are graphics capabilities included?

### Printer

- What print quality do you require:
  Letter quality
  Correspondence quality
  Draft quality?
- Can the printer perform the following functions:
  Boldface
  Underline
  Upper and lower case
  Superscript and subscript
  Graphics
  Colour
  Condensed print?
- What paper type and size can it handle:
  Continuous paper
  Single sheet
  8.5 inch or wider
  Forms?
- Is it compatible with your microcomputer ... and your software?
- What is the quoted speed (in characters per second)?
- Is the noise level acceptable?
- What is the expected ribbon or cartridge life?
- How many character fonts are available?

### Communications

- Will you need to communicate with other micros, a larger computer or an information utility?
- What transmission speed is required?
- Are effective modems and communications software available for this microcomputer?
- Is there a local area network available?

### Other Considerations

- Is portability a concern?
- Is it possible to test the configuration before purchase?
- Is there a separate warranty on each component?
- Are there extended service agreements for all components? At what cost per year?
- Is there a trade-in facility?
- Will all necessary cables be provided?
- Does the dealer have on-site service and a loaner program? ❑

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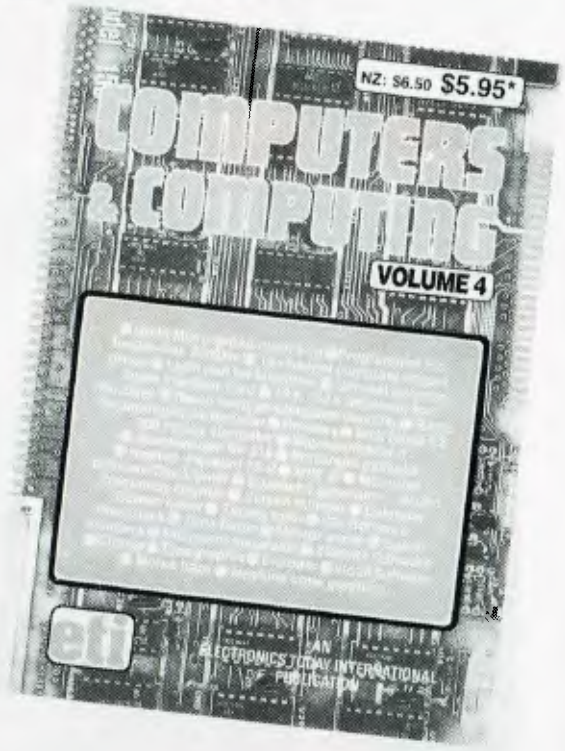


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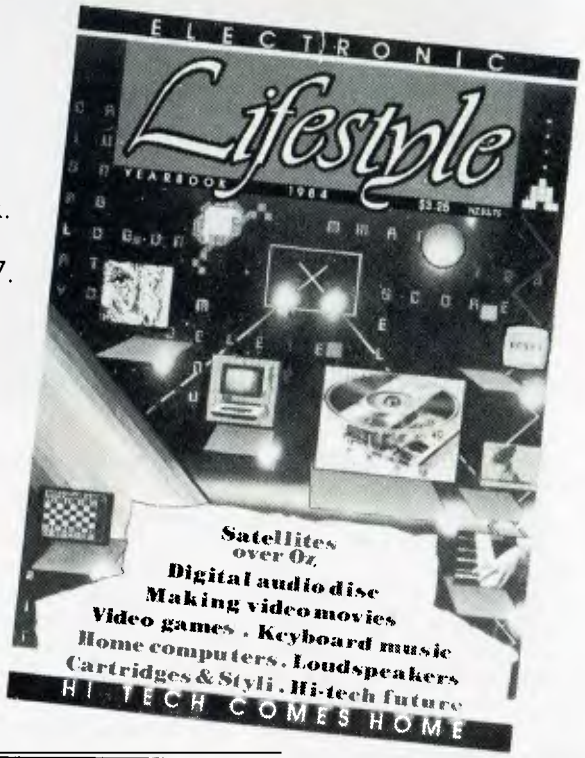


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# Memories are made of this

by Chris Gable

*Computers may not be magic, but they can sure seem that way. They're also intimidating. All that technojargon and computer gobbledy-gook about binary numbers, BIOS, bits and soft sectors is enough to make your head hurt. This introductory article lets you forget all that. Even if it's the only piece you ever read about computers, it will give you a broad understanding of what lurks inside their little silicon hearts.*

We humans use five senses to gather information. A brain then processes it, a memory stores it and a body acts on it.

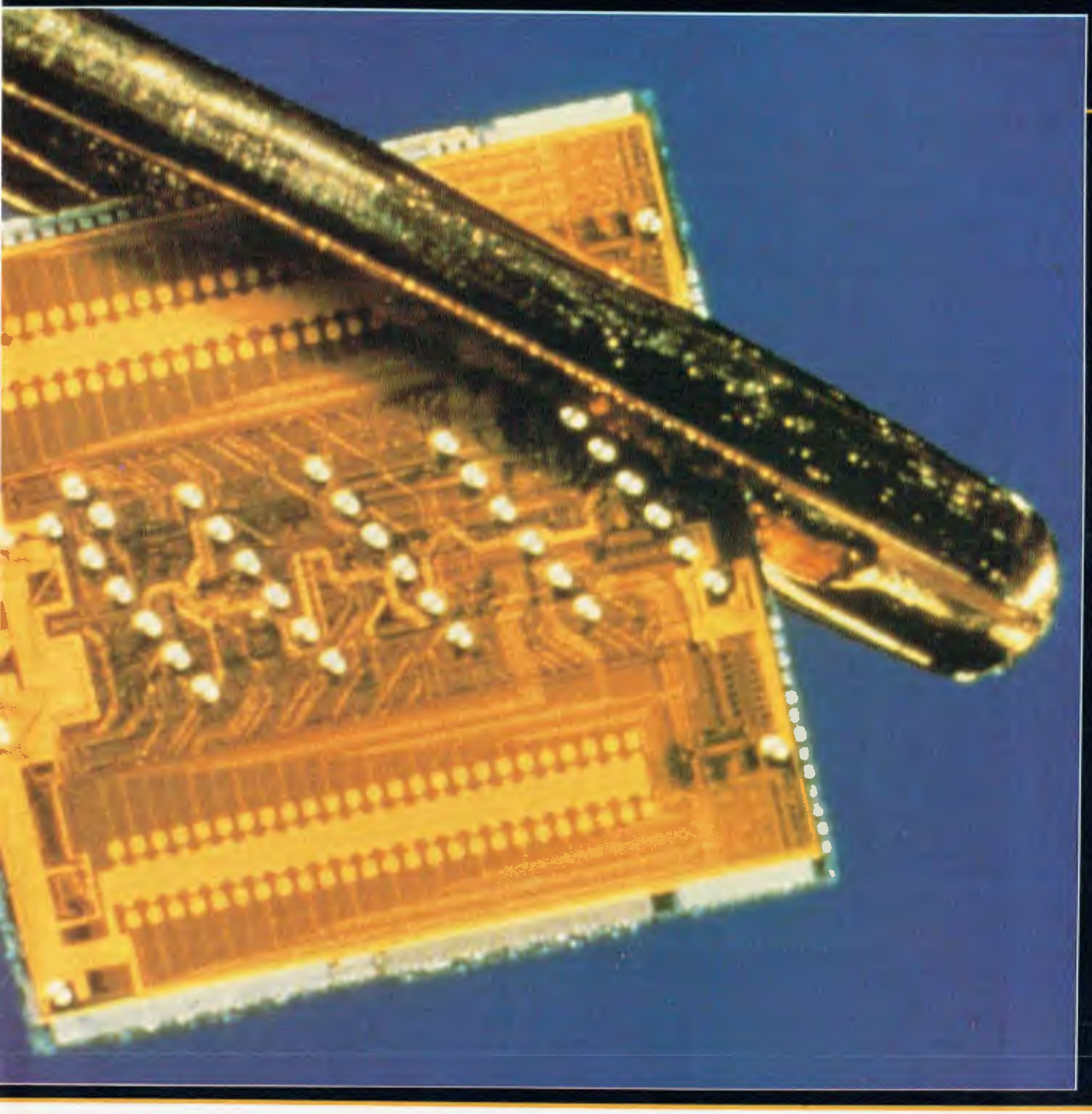
Example: You're singing in the shower and suddenly the water temperature drops by 40 degrees. Your senses inform the brain of this occurrence. The brain, having experienced this situation before, knows it is unpleasant. It directs the body to move out of the shower, the hand to turn up the hot water volume and the vocal chords to holler at the wife who's filling the washing machine downstairs.

Computers work much the same way – except they don't like taking showers and they don't holler at the wife.

### Computer Sense

Instead of five senses, the microcomputer has *input devices* – most often a keyboard, joystick, mouse or, when receiving data communications, a modem. Instead of a brain, the computer has a *central processing unit* (CPU) to assimilate information, and software to tell it how to interpret and act on that information.

Finally, the micro has *output devices* (instead of a body) to let it communicate with the outside world. A video screen is an output device, so is a printer.



OK, so much for grand concepts, let's get down to tin tacks.

**A Bit On Microchips**

You don't need to know much about how a microchip works. Suffice to say it is filled with thousands of tiny electrical switches which are turned on and off, in various combinations, by the letters, numbers or symbols typed onto the keyboard or fed in by a games control joystick, mouse, touch tablet or similar input device. The on/off variations of the switches inside a microchip are translated by the computer's *central processing unit* (CPU) into information which the computer can use in its calculations. They are then translated back to letters, words, figures or graphics on a monitor. The CPU, like most of the major components inside a computer is made up of a combination of microchips.

Newcomers are often astonished that a computer calculates using only ones and zeros (known in the trade as binary numbers).

Combinations of '1' and '0' make up everything the computer understands. For example, a computer understands the number 10 as '00001010'. It understands 122 as '01111010'. The fact that a computer can juggle these strange-looking number combinations, calculate (or *process*) them, then translate them back to figures and letters we ▷

# MEMORIES

understand – all in fractions of a second – goes a long way towards explaining why people believe computers can 'think'.

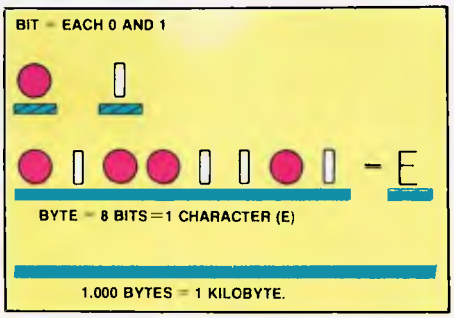
The CPU uses an elaborate form of pattern recognition (of ones and zeros) to sort and re-sort information at blinding speed. It is almost a Morse code system, using ones and zeros instead of dots and dashes. The CPU *processes* these bits and bytes – hence the terms data processing, word processing, and so on.

### The Brains Of The Operation

A microprocessor – the brain of a microcomputer – is just a few centimetres long and a couple of centimetres wide. The capabilities of a processor are measured in bits, with 8-bit and 16-bit processors most common in personal micro-computers.

*Bit* is computerese for binary digit, which is the most basic piece of information a computer can handle. Remember those '0' and '1' combinations? Well each '0' or '1' represents a bit. Eight of them together, as in 00001010, is called a byte. And, dear and patient reader, one byte equals a single character – either letter or number.

If you're moving information through a computer, it stands to reason that a CPU that can shift 16 bits at a time is more efficient than a CPU that moves eight. However, for many applications 8-bit operation is perfectly adequate.




*Right: The numbers from 0 to 255 can be represented using unique combinations of ones and zeros. Above: Each '0' or '1' represents a bit; bits are stored and used by computers in groups of eight; eight bit together are called a byte; and 1,000 of those are called a kilobyte.*

| | | | |
|---|---|---|---|
| 0 | 00000000 | 101 | 01100101 |
| 1 | 00000001 | 102 | 01100110 |
| 2 | 00000010 | 103 | 01100111 |
| 3 | 00000011 | 104 | 01101000 |
| 4 | 00000100 | 105 | 01101001 |
| 5 | 00000101 | 106 | 01101010 |
| 6 | 00000110 | 107 | 01101011 |
| 7 | 00000111 | 108 | 01101100 |
| 8 | 00001000 | 109 | 01101101 |
| 9 | 00001001 | 110 | 01101110 |
| 10 | 00001010 | 111 | 01101111 |
| 11 | 00001011 | 112 | 01110000 |
| 12 | 00001100 | 113 | 01110001 |
| 13 | 00001101 | 114 | 01110010 |
| 14 | 00001110 | 115 | 01110011 |
| 15 | 00001111 | 116 | 01110100 |
| 16 | 00010000 | 117 | 01110101 |
| 17 | 00010001 | 118 | 01110110 |
| 18 | 00010010 | 119 | 01110111 |
| 19 | 00010011 | 120 | 01111000 |
| 20 | 00010100 | 121 | 01111001 |
| 21 | 00010101 | 122 | 01111010 |
| 22 | 00010110 | 123 | 01111011 |
| 23 | 00010111 | 124 | 01111100 |
| 24 | 00011000 | 125 | 01111101 |
| 25 | 00011001 | 126 | 01111110 |
| 26 | 00011010 | 127 | 01111111 |
| 27 | 00011011 | 128 | 10000000 |
| 28 | 00011100 | 129 | 10000001 |
| 29 | 00011101 | 130 | 10000010 |
| 30 | 00011110 | 131 | 10000011 |
| 31 | 00011111 | 132 | 10000100 |
| 32 | 00100000 | 133 | 10000101 |
| 33 | 00100001 | 134 | 10000110 |
| 34 | 00100010 | 135 | 10000111 |
| 35 | 00100011 | 136 | 10001000 |
| 36 | 00100100 | 137 | 10001001 |
| 37 | 00100101 | 138 | 10001010 |
| 38 | 00100110 | 139 | 10001011 |
| 39 | 00100111 | 140 | 10001100 |
| 40 | 00101000 | 141 | 10001101 |
| 41 | 00101001 | 142 | 10001110 |
| 42 | 00101010 | 143 | 10001111 |
| 43 | 00101011 | 144 | 10010000 |
| 44 | 00101100 | 145 | 10010001 |
| 45 | 00101101 | 146 | 10010010 |
| 46 | 00101110 | 147 | 10010011 |
| 47 | 00101111 | 148 | 10010100 |
| 48 | 00110000 | 149 | 10010101 |
| 49 | 00110001 | 150 | 10010110 |
| 50 | 00110010 | 151 | 10010111 |
| 51 | 00110011 | 152 | 10011000 |
| 52 | 00110100 | 153 | 10011001 |
| 53 | 00110101 | 154 | 10011010 |
| 54 | 00110110 | 155 | 10011011 |
| 55 | 00110111 | 156 | 10011100 |
| 56 | 00111000 | 157 | 10011101 |
| 57 | 00111001 | 158 | 10011110 |
| 58 | 00111010 | 159 | 10011111 |
| 59 | 00111011 | 160 | 10100000 |
| 60 | 00111100 | 161 | 10100001 |
| 61 | 00111101 | 162 | 10100010 |
| 62 | 00111110 | 163 | 10100011 |
| 63 | 00111111 | 164 | 10100100 |
| 64 | 01000000 | 165 | 10100101 |
| 65 | 01000001 | 166 | 10100110 |
| 66 | 01000010 | 167 | 10100111 |
| 67 | 01000011 | 168 | 10101000 |
| 68 | 01000100 | 169 | 10101001 |
| 69 | 01000101 | 170 | 10101010 |
| 70 | 01000110 | 171 | 10101011 |
| 71 | 01000111 | 172 | 10101100 |
| 72 | 01001000 | 173 | 10101101 |
| 73 | 01001001 | 174 | 10101110 |
| 74 | 01001010 | 175 | 10101111 |
| 75 | 01001011 | 176 | 10110000 |
| 76 | 01001100 | 177 | 10110001 |
| 77 | 01001101 | 178 | 10110010 |
| 78 | 01001110 | 179 | 10110011 |
| 79 | 01001111 | 180 | 10110100 |
| 80 | 01010000 | 181 | 10110101 |
| 81 | 01010001 | 182 | 10110110 |
| 82 | 01010010 | 183 | 10110111 |
| 83 | 01010011 | 184 | 10111000 |
| 84 | 01010100 | 185 | 10111001 |
| 85 | 01010101 | 186 | 10111010 |
| 86 | 01010110 | 187 | 10111011 |
| 87 | 01010111 | 188 | 10111100 |
| 88 | 01011000 | 189 | 10111101 |
| 89 | 01011001 | 190 | 10111110 |
| 90 | 01011010 | 191 | 10111111 |
| 91 | 01011011 | 192 | 11000000 |
| 92 | 01011100 | 193 | 11000001 |
| 93 | 01011101 | 194 | 11000010 |
| 94 | 01011110 | 195 | 11000011 |
| 95 | 01011111 | 196 | 11000100 |
| 96 | 01100000 | 197 | 11000101 |
| 97 | 01100001 | 198 | 11000110 |
| 98 | 01100010 | 199 | 11000111 |
| 99 | 01100011 | 200 | 11001000 |
| 100 | 01100100 | 201 | 11001001 |

The most popular CPUs in the fractured world computer industry are the Zilog Z80A, the Intel 8088 and the MOS Technology 6502.

### The Go Between

Similarly-sized is the *input/output chip*. It acts as a kind of interpreter, translating your input into patterns for presentation to the CPU. When the CPU has done its thing, the input/output chip translates the results of that processing into English characters and words, decimal numbers and ASCII (American Standard Code for Information Interchange) international-standard symbols. Like the CPU, the input/output chip lives inside the computer. It also converts processed information from the CPU into commands for printers and other peripherals.

### The Front Man

A *video chip* inside the computer displays the results of all this processing on a video screen – either an everyday television set or a purpose-built monitor.

Inside a computer there are also connections for printers and other peripherals, an electronic clock which beats millions of times a second (MHz), a voltage regulator, sometimes a colour video modulator, a keyboard socket and a tiny speaker or buzzer.

### Memories

And then there is this thing called *memory*.

There are two types – ROM and RAM, the mere mention of which is guaranteed to needlessly fog the mental faculties.

RAM and ROM are easy.

ROM (which stands for Read Only Memory) is the information stored permanently inside the computer. The microprocessor can read information from the ROM memory, but it can't erase or alter it.

The ROM holds programs that start the computer when you switch on the power. It also contains certain operating system information. Although not entirely accurate, you could compare a computer's ROM with the brain of a new-born baby. The kid brings certain things into the world with him – his genetic

make-up, basic operating system and instinct. He can turn himself on and off and has the capacity to operate as a fully-fledged person.

*Our input goes straight into RAM, but because it is only a temporary memory, we'd lose every word of it if we switched off the power.*

But he doesn't have the knowledge, experience or memory to do so.

The computer's ROM is installed at the factory (just like the kid's genetic make up) and can't be altered. The Random Access Memory (RAM), however, is a different story.

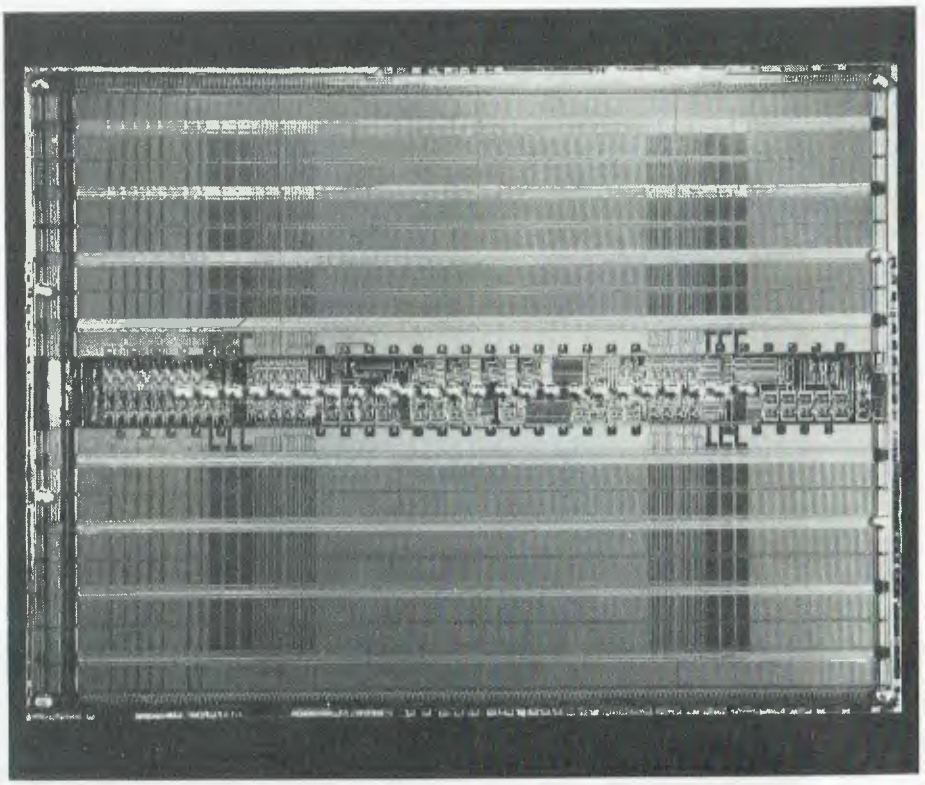
The RAM is the temporary, changeable memory with which you work whenever you use a computer.

Programs are transferred ('loaded' is the correct computerese) from their permanent homes on disk or tape into the RAM, ready to be used. For instance, to write this story we loaded a Wordstar word-processing program from disk into the computer's RAM. Thus equipped, the computer became a word processor. If we'd loaded a spread-sheet program like SuperCalc from disk to RAM, this same computer would perform like an electronic accountant.

Our input (the copy we're writing now) goes straight into RAM, but because it is only a temporary memory, we'd lose every word if we switched off the power. Pulling the plug on a computer gives RAM instant amnesia. Which is why we'll transfer these words out of RAM and into a more permanent home (on a work disk) before we switch off. There are exceptions to this power-off/RAM-amnesia rule, but for now, don't worry about 'em.

Random Access Memory, just like the name implies, can access information randomly from stored or work files, rather than sort through information sequentially, as it did in the bad old, early days of computers. RAM is quicker, giving the CPU the ability to go straight to specific information because it *addresses* information as it is entered. When you want to *access* a piece of data stored in the computer's RAM memory, or on a cassette or disk, the CPU goes straight to the *address* of that information.

So far, so good?



*For your interest, this is IBM's million-bit memory chip.*

### Work Storage Media

Like we said, RAM is generally a temporary memory, so information must be transferred to it (and from it) . This can be done with either a *cassette* (a quality audio recording cassette tape), a 9 cm, 13 cm or 20 cm *floppy disk*, or a *hard disk*.

From those media it can be printed, sent to another computer via a modem or recalled to the screen anytime you need it. RAM also contains the *disk operating system* (DOS), the part of the software program which connects with the computer's ROM operating systems. The most common disk operating system for 8-bit microprocessors is CP/M 80, or simply CP/M (short for Control Program for Microcomputers). Other operating systems include CP/M-86 and MS-DOS (both systems for computers which use 16-bit microprocessors). Don't worry about operating systems yet. Just read the preceding paragraph or two and leave it at that. OK?

### Kill That Byte Myth

The size of the computer's RAM and ROM is expressed in kilobytes, or simply K. Now don't let the fog roll in here – don't go blank on us, please. Kilo equals thousand. If you can grasp that, then the term kilobyte becomes nothing to be feared. You use kilo-metre (or simply km) every day, don't you?

Well, a kilo-byte is no harder to comprehend than a kilo-metre.

Just as a kilometre is a measure of 1000 metres (and, in turn, a metre is a measure of 100 cen- ▷

timetres), a kilobyte is simply a kilo worth of bytes (and, in turn, a byte is a measure of 8 bits). Sort of.

Forgotten what a byte is, haven't you? Tsk, tsk. We'll explain it again.

One bit equals a single '0' or '1'; eight zeros or ones in a group equals one byte. Therefore, one thousand bytes equals one kilobyte. Got that? Well, try this on for size: technically speaking, in computerese, a kilobyte is actually 1024 bytes. But don't worry about it, a thousand will do just fine.

RAM and ROM sizes are getting larger as microcomputers get smaller. The computer which looked after the American man on the moon project had 16K of ROM. Today even a small home computer has 16K of ROM. A powerful personal microcomputer can have as much as 128K of ROM or more, and upwards of 300K of RAM. The more RAM a computer has, the more versatile the computer.

## Memories On Disk

The memory described in most microcomputer specifications is *internal* memory; the term coming from the fact that the ROM and RAM microchips are inside the computer itself. *External* memory refers to the floppy disks, hard disks or cassettes on which information can be stored.

The disks themselves are like 45 rpm records in permanent sleeves. They are made from either plastic (floppy) or metal (hard) and store information much as a cassette player manipulates the chemical particles on a cassette tape to record music.

Disks store information on one or both sides. The amount of information capable of being stored on a side of the disk is referred to as its *density*. A *double-density* disk is capable of storing roughly twice as much information as a *single-density* disk.

## The Two 'R's

As we said a few hundred words ago, programs and information on disk are fed into the computer and stored via pieces of hardware called *read/write heads*. Read/write heads are like the heads inside a cassette or video recorder in that they accept information, record it and play it back. They read and record information from sectors on the disk (segments of the concentric grooves in the iron oxide – yes, rust – particles on each disk) at more than 300 rpm and are housed in *disk drives*. Disk drives may be either outside the computer itself, as peripherals, or built into the 'dashboard' of the computer.

If, as we really and truly hope, you have understood even 50 per cent of what the last 1939 words conveyed, then you're a mile in front of most first-timers. ❑

*The disk drive at right acts as external memory to the computer. The floppy disks shown hold programs which, when loaded into the disk drive, allow the computer to function in different ways.*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# Care

*Many microcomputer 'failures' result from inadequate care and feeding – of the hardware, software and peripherals. The same applies to the poor bunny who sits in front of the screen for hours on end developing the Crook Back syndrome, watery eyes and an irritable temper. Proper preventative measures can help avoid a lot of discomfort. Here are a dozen rules for looking after your equipment ... and one more for looking after the VIP working the keyboard.*

Microcomputers have become tougher as they've become smaller, mainly because the number of components inside microcomputers has been reduced. The machines are now more reliable and fairly rugged – if properly cared for.

Procedures for the care and feeding of a microcomputer are mainly common sense. While common sense is notoriously common to experts, it's usually news to novices.

We'll start with care of diskettes, since they are in many ways what microcomputing (with a disk system) is all about:

**Rule 1:** Damaged diskettes – whether folded, torn, creased, water-logged or rescued from the rubbish – should be thrown out. *Never* try them in a disk drive in the hope of saving their stored data; if you do, you'll more than likely have to look at ways of saving your disk drive. Keep diskettes in their original sleeves when not in use and preferably stored upright in the plastic box they were bought in, or in a purpose-built storage system. Don't store diskettes near flourescent lights, fans or other electrical appliances, or near magnetic devices.

**Rule 2:** Handle disks by their label areas, to avoid touching the recording surface, and gently (oh, so gently) insert them into their disk drives. Never write on a diskette label with a pen or pencil – if you have to write on a label after you've affixed it to the disk, use a felt-tipped pen. Don't 'double-up' on labels; remove old labels and replace them with new labels.

**Rule 3:** The Read/Write heads in a disk drive system are sensitive to dirt and dust. Cleaning with a special cleaning diskette every two or three months is recommended by computer service people. Most operating manuals for microcomputers include manufacturer's recommendations for R/W head cleaning.

**Rule 4:** One of the golden rules applying to disk drive microcomputer systems is never open a disk-drive door while the drive is operating. Similarly, you should never move a disk drive unit while it is operating. Most microcomputers use a red light outside the drive to show that a disk drive is in operation.

**Rule 5:** Like diskettes, microcomputer hardware doesn't take kindly to food particles, dust, dirt or moisture. Keep the area around the computer and its peripherals free of food and drink, dust and moisture. Use dust covers for your hardware when not in use. Leave plenty of open space behind and above the microcomputer and its hardware, to enable the machinery to dissipate heat. Don't place papers or books on top of disk drives or monitors as these will adversely affect heat dissipation.

**Rule 6:** Make sure all cables to and from the computer and its peripherals are free of tight bends and/or kinks.

# & Feeding

By Chris Gable

**Rule 7:** Don't use multi-plug sockets, double adaptors or household extension cords to get electricity to your computer and peripherals. Use electricity outlets which don't also service other electrical devices, including heaters, flourescent lights and electrical motors.

**Rule 8:** Reduce static electricity build-up in carpeted areas by using an anti-static carpet spray or properly earthed static mat.

**Rule 9:** Don't set the contrast level on computer screens and monitors on their full-high level. Screen contrast should be turned down when the monitor isn't being used and turned up only to a comfortable level when in use. Using full contrast for long periods can visibly 'burn' the phosphor coating of the screen and dramatically reduce the quality of the screen image.

**Rule 10:** Screens and monitors should be cleaned with an anti-static fluid, not window cleaner. Most manufacturers specify anti-static products which work best on their screens.

**Rule 11:** Avoid using hard-strike print settings on your printer wherever possible, and generally follow maintenance procedures recommended by the manufacturer. Also use only ribbons, paper and accessories recommended by the manufacturer: something as apparently innocent as a wrong ribbon type can put an end to your day's work and possibly damage the printer.

**Rule 12:** Experts recommend leaving a microcomputer switched on for the entire working day, to avoid the surge of power which hits the computer whenever you turn it on.

**For The Operator ...**

Care and feeding of the computer operator includes correct ergonomics (positioning) of the computer and its peripherals, to minimise back trouble, sore necks, eyestrain and anguish. Eyestrain can be minimised by a high-resolution screen or monitor positioned so it doesn't pick up glare or reflections (some monitors are sold with a glare-reducing coating). The display screen should be below eye-level and angled at about ten degrees from vertical, so that it is perpendicular to your line of sight when your head and neck are held comfortably. The centre of the keyboard should be at elbow level, or about 220 mm above your seat.

None of the above, however, will fully combat the onset of inevitable frustration, anger, irrational behaviour and plain screaming despair that afflicts novice users for the first few weeks of their relationship with The Computer. Keep the patient as comfortable as possible, and the attack will pass. ❑

# PLAYING AROUND

A computer's ability to entertain is quite remarkable. It is skilful, it never gets bored and can play endless variations on the same or different games. The first computer games weren't meant to be just for fun. They were exercises in machine intelligence. The games, like chess and checkers, were written to prove that computers were capable of 'thinking'.

In 1984, the range of computer games is breathtaking, and limited only by the imagination of man (and in some cases, machines). So let's take a look at ten of the most popular games people play.

**Adventure**

This game was a hit from the time it was released on huge mainframes in the early 1970's. Unlike earlier exercises in proving computers could think, Adventure is a game written with the aid of the artificial intelligence unit at Harvard University, USA.

Adventure in its original form is what its name suggests; an adventure. You are an explorer who has to find his way into a cavern system and recover treasure. There is lots of treasure; coins, emeralds the size of a plover's egg, pearls, diamonds, gold nuggets, rare spices, persian rugs, copies of Spelunker magazine and so on.

To help you find the treasure there are all sorts of tools: like keys for unlocking doors, bottles of water, food and caving lamps so you don't fall into pits when its dark. You can also find things in the cave system which, while not treasure, are useful for other purposes. An example, and I'm only going to give one so I don't spoil your adventure, is the pit of oil. When you first see it you shrug and think 'so what, a pit of oil'. But later you come to a rusty door and guess what? You need some of that oil to open the door.

The treasure also has its uses, at times. For example, one item of treasure opens what the computer calls a clam and a pearl rolls out. The computer admits it is not very good at identifying bivalves.

**Keep An Eye Out For The Pirate**

Adventure is based loosely on the board game Dungeons and Dragons. There are dwarves that try to kill you and a goblin or pirate who will steal your treasure. Since the release of the original Adventure, a whole range of games in the same style has evolved. Games such as Zork, Ultima II and the original Adventure run on Apples; African Safari is for the Commodores; and others are available for machines like the Tandy and Atari. All share the same basic concept.

*Computer games have been around since the first computer. Today, the most common reason for buying a personal computer is (you guessed it) ... to play games. If you never saw yourself as a joystick waving, whooping alien zapper or a wily fantasy adventurer, this article might entice you to try your hand – between spreadsheets, of course.*

By Evan McHugh

The original adventure just gave a word picture of your surroundings; what was lying about (like treasure), who was in the room and anything else worth noticing. Some of the later games have incorporated graphics which show you the scene. Even later versions have a degree of animation, with a guide walking around helping you.

All the adventure-style games cost from $60 to $80.

### Space Invaders

One of the real game classics is Space Invaders. It was this game more than any other that created an overnight industry.

A copy of Space Invaders will cost you $10 to $15 and there are versions available for just about every computer around. In fact, many computers supply a copy of Space Invaders on the demonstration tape or disk.

If you haven't heard of Space Invaders then 'Where have you been'. It's a game where you control a laser base that moves across the bottom of the screen. Just above are four houses which you can use for cover. Across the top of the screen are four or five rows by about 15 columns of Space Invaders.

### The Alien Advance

The game begins and the Space Invaders move from left to right across the screen until they reach the right hand side. At this point they drop down a row and start back the other way. Your aim is to wipe out all of the Space Invaders before they reach the bottom of the screen and make a successful invasion of it.

As the Space Invaders scud across the skies of your landscape, they drop loads of bombs. If you get hit by a bomb you are destroyed. Three mortal wounds and and the game's over. But if you pass a preset score, there's an extra chance. To avoid bombs you can move left or right or hide behind a building. The buildings are quite solid, but eventually they crumble under the ceaseless attack of the Space Invaders and your cover decreases. As you fire your laser to destroy Space Invaders you too can shoot holes through the buildings, so spare a thought (a very quick one) for what you're doing.

There are different kinds of Space Invader. Each type is worth a different score when you destroy it. And there's a mystery score for the mothership when it comes across the top of the screen.

If you buy a computer, you will almost certainly find yourself playing

▷

Space Invaders. There are many variations, but the original and simple version is still the best.

**Pacman**

Hard on the heels of Space Invaders in terms of all-time popularity, is Pacman; and there are almost as many variations, although they cost more. Prices start around $20 and go as high as $50.

The aim of PACMAN is to travel around a maze gobbling dots. While munching, you have to avoid the pursuing ghosts which come from their base in the middle of the maze. Eating one of the handful of power pills scattered around the screen will reverse the roles temporarily: after eating a pill you can eat a ghost, for dessert. But after a while the ghosts start to flash, which means they're about to change back into normal spooks. They can still be eaten when flashing, but beware; if they suddenly change back they may eat you before you can eat them.

When you eat a ghost, a little blob, a vestige of the former ghost, is all that's left. This wanders about the maze until it gets back to base. There it's reincarnated as a full-sized ghost and becomes eager for revenge. It really is better eating a ghost before it starts flashing, because it's worth bonus points. The more you eat, the more points you get (belch).

**You'll Have To Diet**

Another way to score bonus points is to eat the little prizes that sometimes appear beneath the ghost base. These can be worth heaps, but the ghosts know when the prizes are there and start hanging around on the off chance you'll make a quick lunge for the prize and they can nab you. One trick, of course, is to eat a power pill and then go after the prize.

When you clear all the dots, the screen resets and off you go again. As you progress, the ghosts move more quickly and become better hunters.

You get three chances before the game ends and then an extra chance after every 20,000 or so points. The high score for PACMAN is something astronomical but a score that you could feel proud of, that puts you in grandmaster class, is 1,000,000. Once you get good enough to achieve a score like this the only limitation of the game is fatigue encountered from playing it for hours.

# PLAYING

### Galaxians

Galaxians is one of the most spectacular games available for home video. It cost about $50. The main attraction is the high speed of movement of many objects on the screen, combined with the high fire rate of the spaceship you control. The result is spectacular simulated attacks that can leave entire squadrons of the enemy in tatters after just one contact.

There are multiple phases with different kinds of spaceship. The spaceships all fly in different ways. Some will be destroyed by a single hit, others take multiple hits to destroy and still others need to be hit in just the right spot to be destroyed.

When you start off you have a spaceship with only one weapon. At the end of the first wave of attack you are given an opportunity to dock. If you are successful, you pick up an extra ship which allows you to double your fire power. It also gives an extra life, since when one ship is destroyed you can still continue with the other. As in other games, you get three ships. When all are destroyed it's the end of the game.

### Defender

Another space-type game is Defender. In this game you find yourself flying above a lunar-scape. You have four directions of movement; up, down, backward and forward. While you are limited by the top of the screen when moving up, and by the ground when going down, you can go as far as you like to the left and right because you remain relatively static and the scenery moves from left to right or right to left around you.

In addition to the normal display, there is also a display generated by the long-range scanners. This gives an indication of what is lurking both in front and behind. You are able to monitor alien activity to see what the little blighters are up to and where they lurk in superior strength.

The enemy is quite a force with which to be reckoned. The aliens have varying levels of skill and a spectacular variety in their arsenal. There are smart ships and smart bombs that home in on you. There are kamikaze ships that fly across the screen at breakneck speed. These move so fast that there is no chance of avoiding them once you see them on your screen. Here, you have to be in touch with the long-range monitor to be able to take evasive action.

### Mutations And All

An extra complication is that some ships go down to earth and kidnap humans. You have to destroy such ships and catch the falling human. If you don't catch 'em, they get shirty and will mutate to help the aliens.

This game gives you three chances, with an extra chance if you live long enough. It's an absorbing game which takes incredible effort to master. The emphasis on co-ordination skills is tremendous. There are a number of versions of Defender, including one for the Texas Instruments 99/4A which has voice synthesis to warn you of impending attack. Defender games are available for most of the major computer brands for around $50.

### Frogger

A game that offers a variation on blasting aliens out of the sky is Frogger. This is a game where you try to stop a frog from becoming a nasty green and red stain on your screen.

You have to help the Freddo jump to the other side of the busy street, and stop him being pureed by the cars and trucks that race along. You use the arrow keys to move the frog forward and backward, left and right, dodging cars. There are sometimes traffic islands which afford safety while you wait for a suitable gap. In some versions of the game there is also a time limit.

### How Could A Frog Cope?

There are basic games of Frogger and extremely advanced ones. Some of the more spectacular versions have rivers with crocodiles and otters and logs to cross, as well as the road.

The great thing about all the frogger-style games is the realistic frog and the way it jumps. These games are all in the $20 to $30 price range.

### Cops & Robbers

One game written in Australia and set to earn some big export dollars is Cops and Robbers. This game runs on the Commodore and is a real-time graphics adventure game. This means you have the same sorts of problems as you have in a normal adventure, but with the added complication of keeping ahead of the cops.

The aim of the game is to get into a building, dynamite a safe, and steal some diamonds. All the while you have to avoid reconnaissance helicopters, shoot police that get too close for comfort and in some cases avoid ghosts. It is not an easy game to play, because it combines fast reflexes with the presence of mind to solve problems as they arise.

The graphics in this game are very impressive. They are in full colour and very well detailed. The sound that accompanies the game is also a lot of fun: realistic bangs when guns go off and scary 'wee oo wee oos' when the cops are around. These should appeal to the person playing the game, but drive the rest of the people around the computer crazy. Cops and Robbers costs $25 to $30.

### Kongo Kong & Co.

Here comes the controversial part of the article. I am going to talk about two games – Kongo Kong and Miner – as though they were one. I think they are.

In their less enhanced forms, they involve wandering about in some kind of labyrinth, avoiding objects that roll at you, fly at you or explode at you. You escape these by leaping out of the way, changing levels, clinging to vines or stalactites or whatever.

That's the fundamental concept and the two games are unmistakably from the same mould. The scenario varies. The scenarios are what give this type of game its lasting and widespread challenge. The people who wrote these games have used their imaginations and created a huge variety of situations for the games player to confront. There are bombs to defuse, lava pits to leap, ▷

# PLAYING

hot rocks to avoid when playing Miner and barrels and birds and crocodiles to avoid when playing Kongo Kong.

The Miner games tend to offer a more comprehensive challenge, but both styles are absorbing ... and Kongo Kong is cheaper. Kongo Kong will cost you about $25 and Miner games will cost from $25 for simple versions to around $50 for some of the more spectacular versions.

### Strip Poker & Flight Simulator

I could be accused of saving the best for last, as the next two programs are just so amazing you'll hardly believe them. They each represent considerable achievement and excellence, not only in presentation, but in execution. While all the games described so far stand out as 'must haves' for any games freak, these two are head and shoulders above the rest for sheer entertainment capacity.

I put them at this end of the article in the hope that all the kiddies had gone to bed by now. You see, one of the games is Strip Poker.

Strip Poker is a game that presents you with a young lady, scantily clad, lying in a suggestive but not totally revealing pose on the screen. The image is digitised from a real photo and has some colour so there is a considerable degree of realism.

To get her to remove her garments, you have to play poker. You and the girl are given a sum of money and when someone loses all their money they have to remove a garment. It should be noted that the young ladies do in fact remove every single garment.

They also play a very good game of poker. They will bluff, fake bad hands, second guess from your bids and display different styles of play. The result is you can take a long, long time to get the first garment off. If you're not very good at poker, you can find yourself getting very frustrated. A corollary of that is if you are very good at poker, you can also find yourself getting frustrated – but in a different way.

People who don't find naked women a particular turn-on when playing can get a data disk with two men on it. There is also a disk with two extra women on it, if you get bored with the first two (you decadent dog).

Graphics and sound on the game are both very good; with large clear colour displays of the cards and realistic sounds as they're shuffled and dealt. The only problem is it's not entirely obvious how to play if you haven't read the instructions.

Strip Poker is available for Commodore and Atari for between $30 and $40.

### Flying High

Flight Simulator is a game with no sexual connotations at all, unless perhaps, you have read Erica Jong's book. It runs on a number of machines, most notably the Apple II range and the IBM range.

It is called a flight simulator, and its express purpose is to as closely as possible match the flying characteristics of a real light plane. As such, it has been played by a number of pilots, many of whom vouch for its authenticity.

One thing you will find is that because it plays like a real plane, a degree of study is required to be able to fully learn the controls and fly the plane. But it's great fun, entirely absorbing and totally worthwhile.

The graphics for the game are great. The resolution is not brilliant, but it's very well worked out. There is a heads-up picture of the scene around you which changes in three dimensions with a sketchy yet perfectly adequate perspective of motion as you fly about. Below that is a very comprehensive instrument panel; with speed, amount of power, angle of the plane, plane level and so on.

The plane can be controlled either through the keyboard or with a joystick. Either way proves to be adequate, as you quickly get used to the controls and then concentrate solely on the problems of keeping the plane flying properly.

One of the things you learn very quickly is that the easiest thing to do in a plane is take off. All you do is flatten it with the throttle and when you're going fast enough, pull back and up she goes. Then it starts to get difficult. If there is any wind, you can end up flipping over and spearing into the ground. You find yourself constantly having to correct the direction of the plane. You then get to do something like a gentle turn. The next thing you know you have overcompensated and you again spear into the ground. And so it goes ...

And you haven't even tried to land the thing yet!

To add realism, there are also facilities to navigate between airports. There are two areas you can fly around in. One is San Francisco, the other is New York . If you wish, you can fly from one to the other, although you can break from reality to avoid having to do a boring eight-hour flight across the USA. The airports also match up to the real McCoy.

As if that were not enough, your light airplane has roughly the same flight characteristics as a WWI fighter plane, so the game will simulate a bombing attack complete with enemy fighter defense for you to play in. This is truly advanced flying and fantastic simulation.

To make things a little easier, you can preset some of the functions. For example, you can turn off the wind and make some of the airplane operations automatic.

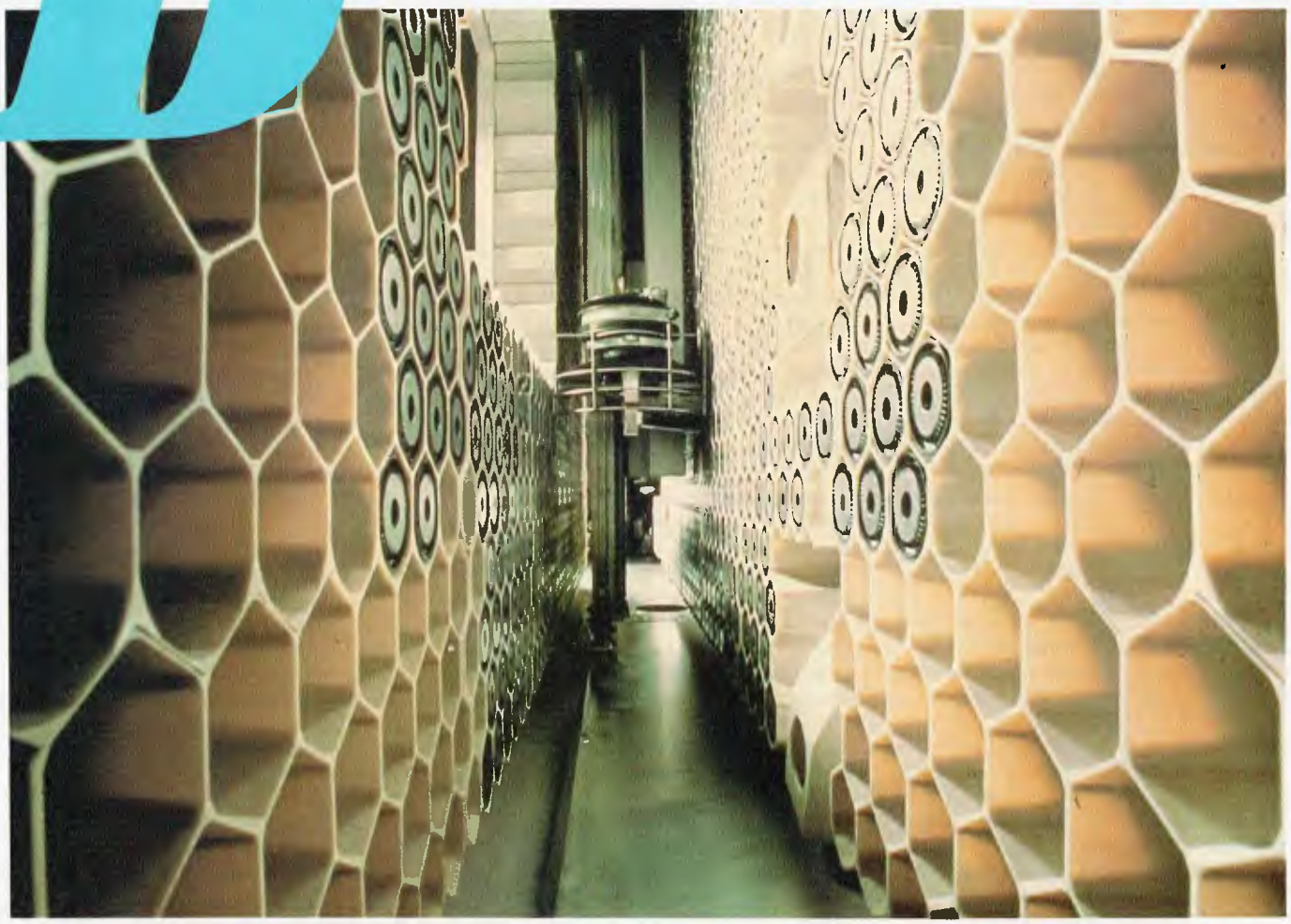
Flight Simulator, with maps of the USA and a flight manual, costs around $80.

### We Could Go On ...

This list of games was compiled with the assistance of a number of Sydney software and games distributors. It was intended as a list of the 10 most popular games available on computers. Some are, without doubt, among the top ten. Others aren't, but are just so good that they had to get a mention. Unfortunately, there was only space for 10 games, so some had to be left out. Others that are obviously worth checking out are chess, checkers, pontoon, backgammon, the Zork series and Scrambler.

There are literally hundreds of amusing, challenging, stimulating games. Some are educational, others are just plain fun. Either way, there's a game to suit everyone out there. ❑

# DATABASES:



*The word 'database' conjures up a variety of images, ranging from huge computer rooms to complex manuals for database programs. Here is a brief guide to what database means for personal computer users ...*

**By Les Bell**

Visitors to the Lockheed Dialog computer installation in California could be forgiven for forming the impression that a database is a very large expensive computer installation that has no relevance whatever to the personal computer user. Dialog is the world's largest database, containing abstracts and references to millions of published articles about biochemistry, geology and just about every other discipline known to man. The information is stored on hundreds of huge disk packs (rather like washing machines), in a computer room that looks like a Star Wars set.

This is the popular image of a database: a vast collection of data stored somehow in a computer. The popular belief extends further: that somehow the computer understands all that information, and to solve problems all we have to do is ask the computer questions. If only it was that simple!

While you can't store the complete contents of the Encyclopedia Britannica on a Commodore home computer, it is nonetheless possible to construct your own databases – on a smaller scale – which work in exactly the same way as on mainframe computers, to help you solve your business or personal problems. Before delving into exactly how this is done, let's examine just what a database is.

### What Is A Database?

Conventional computer programs store information in files, as raw data. Programs can only access their own data, and transferring information between programs is well-nigh ▷

impossible. If you've ever tried to transfer data from your accounting system to VisiCalc for further analysis, you'll know what I mean!

Raw data is not much use to us: it's nice to have a program which automatically sends out invoices each month (programs which automatically pay the bills have less appeal, somehow); but often we need to have other, condensed, forms of the information known only to that program, so we can run our business better. Unless the original author of the program made special provision for this – by including special reports – there is no way we can find out who our biggest debtors are, or calculate what proportion of our business is with interstate customers, or whatever.

The raw data is just information – but being well informed is not enough. We need to have knowledge about our business – for example, that 98 per cent of our bad debts are interstate while only 50 per cent of our business is done there. This leads to wisdom: either screen interstate credit applications more carefully or don't do business there.

If our accounting data is held in a database, we can convert that information into knowledge much more easily, and thus achieve wisdom (at least, that's the theory).

A database is a file, or collection of files, accessed through a database management system which has at least some knowledge of what's in the files and how the data is stored. Most importantly, the database management system has a set of commands which allow us to update, search, examine and otherwise manipulate the contents of the database without writing any programs (again, that's the theory).

## List Or Program

A number of different database management systems (DBMS's) are available for micros, but they split broadly into two types for two different kinds of users.

The first kind, which I term list managers, is intended for non-programmers who simply want to maintain a list of items for some purpose – such as a mailing list, or an internal telephone directory, or a list of cassette tape recordings. Such systems generally implement the most common commands required for maintaining any list: entering records, editing records, printing them, sorting them into order or finding those records that match some criterion. They are generally not programmable; for simple jobs, they don't need to be.

The second kind, which is more powerful and more expensive, is really intended for programmers who want to create programs for specific tasks more quickly (and hence cheaply) than is possible with traditional programming languages. Such a DBMS has all the functions of the first kind – which would normally require lots of programs – plus additional functions for programming, such as the ability to perform complex calculations.

While these systems were originally designed for professional programmers, because of their tremendous power coupled with simplicity they are a good choice for part-time or untutored programmers, too. I know several people who learnt a database language rather than BASIC as their first language, and have written quite sophisticated programs.

## At Bell's Place

At Les Bell and Associates – a small computer consulting company – we have a number of computers with different DBMS programs, and we use them for a variety of different purposes. Some of these will illustrate the capabilities of different types of DBMS.

For example, I maintain a 'to do' file, listing the various things I have to do in the near future. I enter each job, together with its completion date and a priority code, and then sort the file so that jobs are listed by completion date and, within any date, by priority. Then I simply start with the job at the head of the file, as it has the nearest completion date and the highest priority. As each job is done, I delete it from the file and start on the next. The only problem with the system is publishers and editors who try to rearrange my priorities to meet their deadlines!

When I first started using this system, I was using the dBASE II DBMS program. That was a little bit tricky sometimes; for example, dBASE II knows nothing about dates, so to get them sorted correctly I had to enter a date like 15th July 1983 as '830715'. I could have fixed that by writing a little program to automatically put dates into the correct format, and in fact we do that for clients' programs, but what the heck – those funny dates were OK for me.

Lately, I've been using an Apple Lisa with its LisaList program, and here the date format is automatically taken care of – as long as I stick to the American form of date which puts month first, then day, then year. The computer industry seems to have pretty well adopted that format anyway, and even my Seiko watch displays dates that way, so I've given in gracefully.

## User Input

But this illustrates one important point about database management systems: you have to do some work

putting the information that you want to store into the right format. For example, the date given above has to have the zero in '07' to work correctly. A date of '83715' would send the system crazy, or at least appear in the wrong place in listings and reports.

Similarly, each entry in a database is split up into fields, each of which is intended to hold a particular item of information. So a mailing list database, for example, might contain a name field, a street address field, a town field, and a postcode database. In Australia, it's natural to create a postcode field four digits wide – but what happens when you find your first overseas address? How do you cope with a postcode like M4H 1B1 – it's too big to fit, and it contains letters as well as numbers? And where do you put the country – especially so that it prints in the right place on the envelope?

The situation gets worse when you have to cope with addresses containing suite numbers, people's titles and positions, company names, and the like. All of these items have to be planned for and a field provided in the database. After a while, this becomes second nature, but at first, even with careful planning, you'll find you are perpetually modifying databases to add fields.

### Databases In The Home

Lots of other applications for simple list management suggest themselves. At home for example, you have a lot of property which you have (I hope) insured against theft, fire and other forms of damage. But what about that video recorder you bought last month – and the camera you bought for your last holiday. From time to time you should update your insurance policies, but listing all the items insured can be a nuisance.

Instead, why not list all the items, together with their value, in a database? Then you need only add the new items as they are bought, and the DBMS can automatically calculate the total value to be insured. Don't forget to insure your computer and software! Such a database can also be useful when arguing about warranty periods or when to return the camera for service.

A database system can also be useful for keeping track of household budgets or business expenses. Simply assign each expense item to a category and then sort the file by category and total by category – then compare with the budget you've set yourself (or been set by the boss) to see how well you're doing.

*Each entry in a database is split up into fields, each of which is intended to hold a particular item of information.*

### On The Phone

In a large organisation, it can be difficult to keep track of who is on what extension of the phone system and somebody (usually the switchboard operator) is lumbered with the task of typing up an internal telephone directory. With a simple database system it is easy to produce updated directories, sorted by surname, by department, or however, as often as required.

Small retailers can even keep inventory and stock control systems on simple database systems with no programming, although this does require a lot of constant updating. It is also possible to keep customer records and mailing lists on the system.

### Time Accounting

The more sophisticated database management systems can be used for complex applications. For example in our office, invoicing is being done by a professional time accounting system which keeps track of who is working on which jobs, for how long, and what materials they have purchased in the task. This system, which was written in dBASE II, uses seven basic database files to keep track of purchase orders issued, hours worked by employees and other information. While it comprises a couple of dozen separate programs, it did not take nearly as long to write as a comparable program in a conventional language.

One major advantage of using this system is that I can easily find answers to questions which I had not anticipated. For example, to compare the number of hours required to write different programs, I can easily ask for a report of hours worked, sorted by job number and by employee. Similarly, I can ask for reports showing which of our clients are slow payers, who (or what kind of work) is returning us the best profit per hour worked, and so on. The database system is extremely versatile.

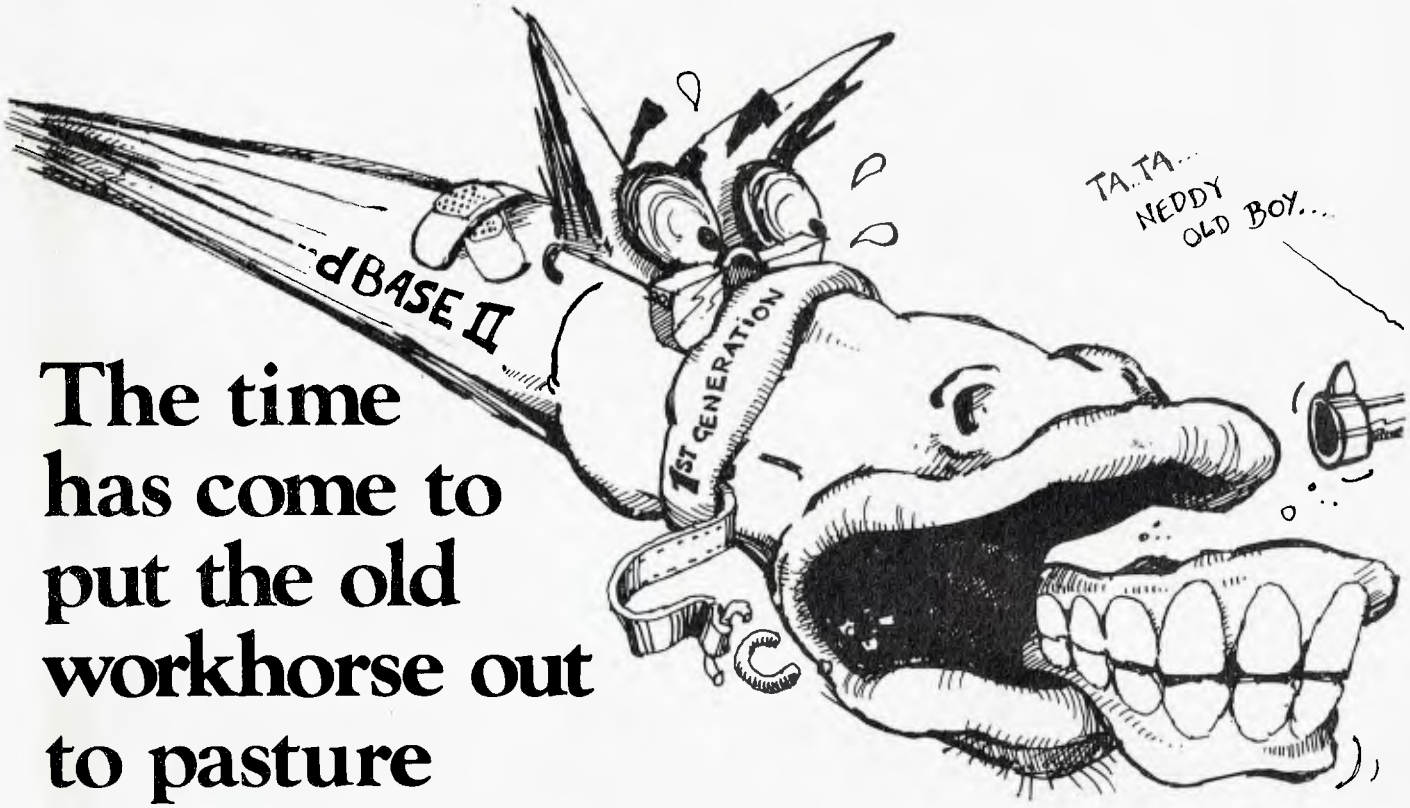
### As A Language

A DBMS can be used to write virtually any kind of commercial program which could be written in a conventional programming language like COBOL or BASIC. The DBMS has the supreme advantage of making program development quicker and cheaper, but it has its disadvantages, too: complex applications may run more slowly or be more awkward to use, and the database files may take up more space than conventional files.

A number of different commercial database products are available: for list management check out pfs:File and Visifile (both available for IBM, Apple and other machines), and Friday! and CardBox (both for CP/M and MS-DOS machines like the Kaypro, Morrow, Apple II with SoftCard, or the IBM-PC).

For programming tasks the most popular product is dBASE II from Ashton-Tate, which has sold over 200,000 copies. While it is no longer the 'state of the art', there are advantages to sticking with a popular, well-tried and widely understood product. Others to investigate include Knowledge Manager, Rbase, Delta, Condor, FMS-80 and TIM III.

Whatever product you choose, you can be sure it's got to be better than writing reams of BASIC code! ❑




# The time has come to put the old workhorse out to pasture

The days when dBASEII* stood all by itself at the apex of the database management pyramid are past. The old workhorse has been put out to pasture by a new breed of faster, easier, more powerful packages.

It's not that the old horse hasn't done its job: it has, gloriously. Those of you using dBASEII know that it has paid for itself many times over. In its time it was dBest. And now there's no denying that it's slow, it's cumbersome, it's difficult to live with — when you compare it with some of the newcomers on the market.

## Fresh out of the starting gate.

So who are the newcomers that have usurped the old master's position?

### Delta:

We regard it as the most complete user-oriented database system on the market today and for the forseeable future. Delta caught our attention when it received the UK government's prestigious RITA award for "best software of its kind", followed closely by IBM UK's adopting it as their own distributed product for the IBM PC. Everything we have learned about it since working with it here has served only to increase our enthusiasm. Delta has so much to offer — and you don't have to be a programmer to get it all.

### Dataflex:

Dataflex is a true multi-file, multi-user database management system. "Flex" offers you unlimited flexibility in the development of high quality, easy to use database applications – in a minimum of time. "Flex" is for software developers everywhere, as well as for users with complex applications.

## Take some advice from an experienced punter.

"Dataflex . . . truly the best application development tool on the market today. Its power and flexibility have enabled us to write a total package in less than 50% of the time compared to conventional methods."

**Tim Lamberton, M Sc.**
software consultant to
Occidental Life.

## Place your bet on a winner.

Delta and Dataflex are available at leading computer stores everywhere. Ring up your local dealer and ask him for a demo. If he doesn't know about the product you're interested in, ring us. Or better yet, have your dealer ring us. It's time he got on the inside track.

*copyright Ashton-Tate. **Offer holds until May 30.

Delta and Dataflex distributed in Australia by

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South Melbourne Vic 3004.
Phone: (03) 51 1406 Telex: AA39219.
**Brisbane:** (07) 343 9122 **Perth:** (09) 322 1677

# Bits by Bucks

*What everybody really wants to know is which computer they should buy, and how much it will cost to get it functioning. While we can't advise on what the best computer for each user application is, we can relate different price brackets to what we know are good computers – and so we have.*

By Phil Scott and Matt Whelan

There is a television advertisement in America that goes something like this:

Customer in computer store : "I'd like that $995 computer please".

Salesman: "Yessir... that'll be $2150 and shall I wrap it?"

Customer: "Oh, well I think I'd rather have that $1195 machine ."

Salesman: "Yessir, that one costs $3100"

Customer: "..and the $1500 computer; how much does that cost?"

Salesman: "$4400 sir."

Customer: "The $2000 computer?"

Salesman: "Certainly sir, that's $5300."

That particular ad rams home (pardon the pun) one of the biggest problems facing the computer buyer; simply that what you sees ain't necessarily what you gets.

### It's Not The Full-Cream Milk

In Australia the scenario is exactly the same. As the learned Prof. Julius Sumner Miller would ask, "Why is it so?" There are all sorts of reasons why computer manufacturers advertise only their machine prices and conveniently forget to include small items like 20% sales tax, optional cables that you must have if you want to use the machine, minor things like data recorders and screens – even the software you need to make your $399 bargain operate.

For the uninitiated, a close encounter of the expensive kind can come as a rude shock. Which is why we decided to do something about it. How?

We asked every computer manufacturer, importer and distributor in Australia to supply us with details of their complete packages – price, brief specs, features and a list of extra cost options. We wrote to all of 'em, stressing that we wanted a system price (not just a machine price) that a real-world customer would pay, then be able to take the gear home and get straight into it without spending an extra cent.

### On The Level

We believe most companies played by the rules, with the result that we now have one of the most comprehensive listings yet committed to paper. Naturally, there are some brands which don't appear in our chart. We asked 'em to participate in what amounts to a free-of-charge advertisement ... but they didn't bother to reply. Maybe there's a message there somewhere?

To make our listing more relevant, we've broken it up into price categories so you can see, at a glance, exactly what your hard-earned dollars will buy from each of the hardware houses.

Taking that idea a step further, we asked the staff of *Your Computer* magazine, the biggest selling computer buff-book in the nation, to give a brief run-down on what they considered to be the best buys in each category.

### Hearken!

Before we delve into that subject, some words of wisdom are in order from the founder of the aforesaid publication, Mr Matt Whelan.

Whelan advises two approaches to buying that first computer.

Plan A, he says, is for people who think they might like to find out what this micro business is all about, but aren't really sure they need to. For these basically hobbyist buyers, Whelan's advice is succinct:

"Spend as little as possible and be prepared to write off the investment if computing doesn't appeal to you. On the other hand, if you get enthusiastic, still be prepared to write off that initial investment. Too many people fall into the trap of buying a cheap machine then spending a small fortune expanding it with more memory, disk drives and software; when they'd be much better off – both financially and in terms of performance – to give that ▷

*The Morrow MD-II represents sensational computer value in Category C.*

*The Microbee is one of the few inexpensive machines that is worth expanding. It is a good first-time user computer, although not ideal for business applications.*

*The Commodore 64 is another good first-time user machine, battling it out with the Bee for supremacy in Category A.*

*For business use, the Osborne I represents excellent value for money in both hardware and software. Shown here is the Osborne Executive model.*

first machine to the kids and go buy something that incorporates plenty of memory, a disk drive or two and is capable of running more advanced software." That's Plan A.

For the serious computer user – for example, the businessman who knows he wants a micro, but isn't sure what he needs and how much he needs to spend – the Whelan Plan B approach is worth considering.

"Find the software that best suits your needs as the first step, then extend yourself as much as possible and buy the best hardware you can afford to run that software. It's wise to look at expansion capacity – like extra memory – that can be added at some time in the future. Like shoes, people tend to grow out of their computers after a year or two, and first-time buyers want the assurance that more capacity can be added when the time comes."

Without further ado, may we present the first of our package price categories:

## CATEGORY A $250- $1,500

### It's A Shoot-Out

According to the *Your Computer* panel, Category A boils down to a shoot-out between the Microbee Experimenter/Educator twins and the Commodore 64.

After some debate, the decision is a toss up, a case of personal preference.

Here's what they said:

"The Microbee Experimenter is a $677.95 machine that comes complete with a proper green screen monitor, data cassette recorder and a start pack of software. The one drawback is the limited memory – only 8K – which is why we'd recommend spending an extra $50 to buy the Microbee Educator model. It's the same machine, but with 16K capacity.

*The IBM-PC, released in 1983, retails at $3,429.*

### Bee's Best Bits

"The Bee's best points are excellent software availability, particularly games and good educational programs (which you'd expect, as it's used widely in schools), the fact that a modem is available as an extra cost option (at $149.50) and communications software is built-in. It has good expansion capability to 64K and disk drives are available. Both at reasonable prices. In fact, the Bee is one of the few inexpensive machines that is worth expanding. It's a good first user computer and although it's not really ideal for business applications, it is better suited than many other machines in this class that are used in business operations.

"The Microbee's negative aspects are mostly related to quality control and, on occasions, after-sales support. The company grew very quickly and, in the early days of that success, wasn't really prepared for it. Today, the attitude to support is a good one and more staff have been added to make sure that attitude is translated into action. Quality control is improving all the time."

### Commodore's Cogent Case

The case for the Commodore 64 is a strong one, too. Here's how the *Your Computer* people summed the salient points:

"The Commodore is a 64K computer with colour capability a standard feature (an extra cost option with the Bee), lots of software and good after sales support. Not a good expansion proposition even though plenty of peripherals are available. The disk drive units are painfully slow. At $677.95 for the Starter Pack and $797.95 for the Education Pack, the Commodore represents reasonable value for money. Not a computer we'd use for business applications."

### Other Options

Other Category A contenders that come highly recommended are the Mitsui Sord at the bottom end of the market ($395) and at the top end, the Microbee Personal Communicator ($1326) which comes with 32K, inbuilt word processing, green screen, printer and modem.

For specialist business use on the run the NEC 8201A and Tandy lap computers also get the nod.

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# SYSTEMS DIRECTORY

## CATEGORY A $250-$1500

| | Grp/Price($) | Machine | Items Included | Peripherals Included | Accessories Included | Options Available |
|---|---|---|---|---|---|---|
| A | 289.00 | Sharp PC1401 Pocket Computer | PC1401 Pocket Computer | CE126P Printer and cassette I/F | EA1250P x 3 paper rolls | CE152 Cassette Recorder |
| A | 395.00 | Mitsui SORD M5 | Keyboard<br>Joypads<br>Power Supply<br>Cables<br>User Manual | | Basic G Cartridge & Manual<br>Faic Cartridge & Manual<br>Games Tape<br>Basic Cartridge | |
| A | 399.00 | Atari 600XL | 16K computer | | | Program Recorder $159.00<br>Disk Drive $699.00<br>Color Printer $399.00<br>Letter Qual. Printer $529.00 |
| A | 399.00 | Spectravideo SV-318 System 1 | 32K Basic computer, power supply, modulator, cables, instruction manual, extended microsoft BASIC. | SV-903 data cassette | Tapes: Intro to BASIC, Spectra Home Economist, Spectron, Armoured Assault. | Disk drives, 64K RAM, 16K RAM, printer, 80-col card, RS232 card etc. |
| A | 434.00 | Sharp PC1251 Pocket Computer | PC1251 Pocket Computer | CE125 Printer and microcassette | Program tape containing various programs | |
| A | 449.00 | Spectravideo SV-318 System 2 | 32K Basic computer, power supply, modulator, instruction manual, extended microsoft BASIC. | SV-602 Coleco Adaptor | SV-103 Spectra Coleco Joystick. | Data cassette |
| A | 513.95 | Commodore Vic-20 Starter Pack | 5K Vic-20 Computer with VHF TV | Datasette Cassette Recorder | Introduction to Basic Part 1, 3 games cartridges, 3 education programs, joystick & paddles | 16K RAM Pack $99 |

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|---|---|---|---|---|---|---|
| A | 599.00 | Atari 800XL | 64K computer<br>Power supply cables | | | Program Recorder $159.00<br>Disk Drive $699.00<br>Color Printer $399.00<br>Letter Qual. Printer $529.00 |
| A | 674.00 | Sharp PC1500A<br>Pocket Computer | | CE150 Printer and cassette, CE152 Cassette Recorder,4K RAM Expansion. | EA150 Adaptor, EA850 4-color pen, EA1500P x 3 paper rolls | CE153 $180 software board CE155 8K, RAM Exp $1433 CE158 RS232C I/F $285 CE159 8K RAM/ROM $175. CE161 16K RAM module $270 |
| A | 677.95 | Commodore-64<br>Starter Pack | 64K Computer with built-in UHF TV Modulator, power supply, RF video cable and manual | Datasette Recorder. | Introduction to BASIC Part 1, one game cartridge and cassette bonus pack | 4-color printer/plotter $299 inc. cable |
| A | 677.95 | MicroBee<br>Experimenter | 8K Series II machine only, power supply cables | Data cassette, green screen | Demonstration tape, Tapes: Games Pack, Typing Tutor, Learning Can be Fun - Vol. 1A. | Bee Modem $149.50 |
| A | 679.90 | Commodore Vic-20<br>Programmer's Pack | 5K VIC-20 Computer with VHF-TV Modulator and Manual | Datasette Recorder, 4-color plotter printer, cables included | Introduction to BASIC Part 1, Programmer's Reference Guide, super expander cartridge | VIC programmer's aid cart. $29 |
| A | 686.00 | TRS-80<br>Color Computer 2 | 16K standard microsoft BASIC. | TP-10 Thermal printer | Scripsit ROM cartridge, color file ROM cartridge, spectaculator ROM cartridge, joysticks, printer cable | Cassette recorder $89.95<br>Disk drive $699. |
| A | 699.00 | DSE The Cat | 64K machine, parallel port, RGB output, function keys, numeric pad, joystick port, 4 ch. sound, 560x192 graphics, 32K RAM, 6502A@2Mhz, | 80-col. card | Demo. tape, cables, manual. | Emulator cart.$99,RF Mod $34,Dsk Cont.$149,Disk Drive$349,RS-232 Adapt.$129,Dual j/stick$35,RGB Mon.$599,Printer Cab.$39,Std. high res.mon. $249. |
| A | 699.00 | Spectravideo<br>SV-328 System 1 | 64K Basic Computer inc. microsoft, extended BASIC, power supply, modulator, instruction manual. | SV-903 data cassette | Tapes: Intro to BASIC, Spectra Home Economist, Spectron, Armoured Assault. | Disk drives, 64K RAM, 16K RAM, printer, 80-col card, RS-232 card. |
| A | 797.95 | Commodore-64<br>Education Pack | 64K Computer with built-in UHF-TV Modulator, power supply, RF video cable and manual. | Datasette Recorder. | Introduction to BASIC Part 1, Gortek & The Microchips, Logo and cassette bonus pack. | 4-color printer/plotter $299, or MPS-801 Dot Matrix Printer, $399 cables included. |
| A | 995.00 | The Challenger | 128K Machine, RF output, | Composite output, RGB output, joystick port. | Additional 128K RAM @ $197.10 parallel printer port, cassette port, cables, manual. | |
| A | 1095.00 | NEC PC8201A | 16K Std. RAM, 32K Std. ROM, programs in ROM are basic inter., text & telecom. | | Appln. kit cassette tape: mem. calculator, text formatter, investment portfolio, linear f/caster, loan eval., sched. keeper, char. definer, bank backup, | Exp. RAM $129, RAM cartridge $482.20, Ni-Cd battery $27.90, thermal printer $226.40, data recorder $138.20, cable $50, RDS-232 cable $47, etc. |
| A | 1095.00 | Vectorio<br>64Z Starter System | 64K computer 280 & 6502 will run CP/M & Apple II s/ware, separate numeric key pad. | 1-20 meg. high-res. green monitor, disk drive, cont. card. | Comprehensive manual, 54 pre-programmed s/ware functions. | Speech synthesiser, graphics tablet, light pens, printers, RS232 cards, 80-col. card, buffer card, modem, joystick Eprom programmer etc. |
| A | 1180.00 | Vectorio<br>64A Starter System | 64K computer, 6502 with 12K of ROM, built-in self-test, word process., separate numeric key pad | 30 cm high res. monitor, disk drive controller card. | Comprehensive manual, 54 pre-programmed software functions. | Speech synth., graphics tablet, lt. pens, printers, RS232 cards, 80 col card, buffer card, modem, joystick, Eprom programmer etc. |
| A | 1326.45 | MicroBee Personal<br>Communicator | 32K Series II, power supply cables, WordBee in ROM, Comms. in ROM, Microworld 16K Basic | Data Cassette, green screen, Admate printer, printer cable, Bee modem | Book: Intro. to MicroBee and 1st 100 programs. Tapes: Basic hints, Typing Tutor, demo tape. | RGB color module $125 |
| A | 1360.00 | Excalibur 64 | 64K RAM<br>Microsoft Basic<br>26 Colours<br>PWR Supply Cables | Color RGB Monitor<br>Cassette Recorder | Manual - Basic<br>2 X Games<br>Software | ROM Expander $99.50<br>Fortran in ROM<br>Pascal in ROM<br>Word Processor in ROM |
| A | 1437.00 | TRS-80 Model<br>100 Portable 8K | Built-in: word processing, address book, diary, communications, printer, LCD. | DMP 110 50 CPS, Dot Matrix printer. | Printer cable, AC adapter. | 8K memory kit $169.95 |
| A | 1499.00 | Spectravideo<br>SV-328 System 2 | 64K Computer inc. microsoft ext. BASIC, power supply, modulator. | 7 slot expansion board, disk control card, disk drive. | Disk BASIC software & manual, CPM software (package) & manuals. | Disk drives, 64K RAM, 16K RAM, printer, 80-col card, RS232 card etc. Perfect: writer, filer, calculator. Spectra business manager. |

## CATEGORY B $1500-$3000

| | Grp/Price($) | Machine | Items Included | Peripherals Included | Accessories Included | Options Available |
|---|---|---|---|---|---|---|
| B | 1605.00 | Fox 640Z | 64K RAM, 650 & 280A CPU, 8-bit inbuilt fan, QWERTY k/board numeric k/board, Apple comp., 6 exp. slots, voice synth. disk controller, power supp, cables, | graphics, FOX-DOS, FOX-GRAF, Soft Apple voice disk Peripherals: 30 cm green monitor, 143K disk drive. | Manuals | Music machine, light pen, disk drive, color monitor, joystick, plotter, printer, RAM UPgrades. |
| B | 1677.00 | Commodore-64 Business Pack | 64K Computer with built-in UHF-TV Modulator, power supply, RF video cable and manual. | Disk drive and MPS-801 Printer, cables included. | Easy Script word processing Easy Calc electronic spreadsheet, and easy mail mailing list programs. | Magic Desk 1 (type & file) $60 Super Base 64 DataBase $180, Diary-64 $55. |
| B | 1775.00 | Apple IIc | Apple IIc 128K mem.,2 ser ports, mouse i'face, 40/80 col disp, double high res. graphics, disk drive & additional disk drive controller. | RF modulator, floor mounted power supply. | In box tutorial diskettes | Mouse Monitor IIc $145, Scribe Printer $435, 80 x 24 flat panel display (Sep 84) |
| B | 1799.00 | President RoadRunner NoteBook Comp | Batt pak charger, 5K data cart, user manual, RS232 module, personal scheduler, name/address book, phone directory, text editor, terminal package. | | | 8K RAM cart $85, 16K cart $135, 32K RAM cart $270, 64K RAM cart $540 Microsoft BASIC $140 Super-calc $180 add. battery pack $49 A/C charger $15. |
| B | 1850.00 | Med-Fly 64K Starter System | 64K computer, Z80 & 650Z will run CP/M & APPLE II s/ware, can run Version 3.0 CP/M. | 30 cm high-res, 20 Mhz green monitor, disk drive, cont. card, 8-col, 40/80 soft switch, Serial 4 parallel port, fan, RGB color, sep keyboard. numeric keypad. | Operator's manual, booter disk, utilities disk, 16 programmable function keys under CP/M 3.0. | Speech synth, graphics tablet, light pens,printers, RS232cards, 80 col card, buffer card, modem, joystick, Eprom programmer kit. |
| B | 2043.00 | TRS-80 Color Computer 2 | 64 extended microsoft BASIC | 150 K floppy disk drive, DMP 110 50 CPS Dot Matrix Printer | Disk Scripsit, disk profile, disk spectator, printer cable. | Color mouse $69.95, daisywheel printer $1299 |
| B | 2075.00 | Med-Fly 128K Starter System | 128K computer Z80 & 650Z will run CP/M & Apple s/ware, can run Version 3.0 CP/M. | 12 in. high res. monitor with built-in filter screen, 2 x 13cm disk drives, cont. card, 80 col., 40-80 col. soft switch, super serial & par. print. port, fan. | Operator's manual, booter disk, utilities disk, 16 programmable function keys under CP/M 3.0. | Speech synth., graphics tablet light pens,printers, RS232cards, 80 col card, buffer card, modem, joystick, Eprom programmer etc. |
| B | 2160.00 | Kaypro II Portable | 64K CPU, 2 X 200K disk drives,green monitor, Wordstar, printer, Mail-merge, Datastar, Calcstar, Super Sort, The Word Plus, MBASIC, CP/M | | | Printer, modem. |
| B | 2172.95 | MicroBee APC | 64K series II, 400K disk drive, cables, Wordstar, Multiplan, Microsoft BASIC, CP/M & 2.2 Microworld & BASIC Disk. | Green screen, Admate Printer, Printer cable | Wordstar & Multiplan manuals, Microsoft, BASIC, Microworld and operating manuals. | Second disk drive 400K $300 |
| B | 2178.00 | Commodore Exec-64 Business | SX-64 Portable computer with built-in 13 cm color monitor and disk drive. | MPS-801 printer with cables | Easy Script word processing, Easy Calc electronic spreadsheet and easy mail software. | Magic Desk 1 $60, Superbase 64 Database $180, Diary-64 $55. |
| B | 2478.00 | Excalibur Bus. Machine | 64K RAM Microsoft BASIC, 26 colors, PWR Supply Cables, Disk Drives, Disk Controller Board. | Color RGB Monitor | Manual | |
| B | 2595.00 | Apple IIe 128K Memory | Duo disk with controller, 80 col card, monitor II training material | | | Imagewriter $754 LQprinter $3100 Mouse $245 |
| B | 2715.00 | Sharp MZ3530 Desk-top Computer | MZ3530 with MFD 30 cm green monitor, keyboard. | | CP/M and manual, User documentation | 80 col Dot-matrix printer, Cable for printer, color monitor. |
| B | 2724.00 | Sanyo MBC 555 | MSDOS 8088, 128K Std RAM, 640 X 200 dots color graphics with BASIC language supporting graphics 80 col high-res. monitor. | Single 160KB floppy disk drive, keyboards and CPM 80877 arithmatic processor option std, centronics parallel port. | BASIC, MSDOS, W/Star, C/Star, M/merge, Spellstar, Reportstar, Datastar. | +128K RAM, RS232 board, Joystick port, pascal, fortran, cobol. |
| B | 2750.00 | Morrow MD2 | CP/M operating system, 280 proc., 2 x 200 K disks, 64K RAM, cable for power, Wordstar, Logicalc, Personal Pearl MBazic, Bazic Pilot. | 80 char X 24 line, green phosphor monitor and full alpha number keyboard with function keys. Power and interface cable. | All manuals & software disks. | Printer |
| B | 2838.00 | Kaypro-4 Portable Computer | 64K CPU, graphics, anti-glare screen, fan, 400K drive, real time clock, modem, Software: Wordstar Mailmerge, Calcstar, Infostar, Word Plus, Superterm, etc. | | | |



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## CATEGORY C $300-$6000

| | Grp/Price($) | Machine | Items Included | Peripherals Included | Accessories Included | Options Available |
|---|---|---|---|---|---|---|
| C | 3066.00 | IBM PC | System Unit (64K), keyboard, 160K diskette drive. | - | BASIC Ref. manual | Exp unit $5325, Exp unit $4261, 10Mb fixed disk drive $2622, mono display $644, maths co-processor $401, 64K mem. exp $251,printer cable & stand, etc. |
| C | 3200.00 | Decmate II PC278-A | 6120 CPU with 96K RAM and dual 400K floppy storage plus printer port, communications port, printer cable. | Floor stand, monitor & cable, country kit (includes keyboard) | WPS-8 all modules, V1.1 (no Winchester support) base, sort, math, list processing and communications. | 100 CPS personal printer, $1100, letter quality printer $3000, dual tray sheet feeder $2200, bidirectional forms tractor $340 CP/M option card $590. |
| C | 3300.00 | SME Systems Knight 2000 | Complete 256K, Z80 computer with CP/M 3.0 3 serial ports, two 13 cm floppy disks, high res, graphic monitor and keyboard. | - | Operating system | All CP/M software, extra floppy and hard disks to 50M, printers |
| C | 3300.00 | DEC Rainbow PC100-P3 | Z80 plus Intel 8088 CPU (8 & 16 bit 128K RAM and dual 400K floppy storage, 10MB Winchester & Controller, printer port, comm. port, printer cable | Floor stand, monitor & cable, country kit (includes keyboard) | CP/M 86/80 V2.0 & MS-DOS V2.05 | 100 CPS Personal Printer $1000 Amber monitor & cable $500, 256K foundation memory board, graphics option module & col mon cable cable $550. |
| C | 3385.00 | Morrow MD3 | CP/M operating system. Z80 processor, 400K drive, 64K RAM, power cable, Newword, Logicalc, Personal Pearl, Quest Bookeeper, MBasic, Basic Pilot. | 80 char. x 24 line. Green phosphor moniter and full alpha number keyboard with function keys. Power and interface cable. | All manuals & software disks. Carpe business software. | Printer 8088 Co. processor. |
| C | 3429.00 | IBM.PC | System Unit (64K), keyboard, 320K diskette drive. | - | BASIC Ref. manual | Exp unit $5325, Exp unit $4261, 10Mb fixed disk drive $2622, mono display $644, maths co-processor $401, 64Kb mem. exp $251,printer cable & stand, etc. |
| C | 3435.00 | Sharp PC5000 Portable Computer | PC5000, CE510P Thermal Printer | | CE100B Bubble Cartridge | CE510F Floppy disk drive, CE101F MS-DOS disk + manual, CE100M 64K exp. module |
| C | 3445.00 | Apple Macintosh | Macintosh 128K memory, monitor, 400K Disk 9 cm. | Mouse | Tutorial guide, Macwrite/paint | Imagewriter $754 carrycase $155 Add-on-drive $710 |
| C | 3500.00 | Sharp MZ5500 Desk-top Micro. | MZ5500 with MFD 30 cm monitor keyboard. | Expansion unit, 20 cm interface, 20 cm dual drives, cable for 20 cm drives. | CP/M-86 and manual user documentation. | 80 col. dot matrix printer with cable, color monitor, integrated hard disk. |
| C | 3550.00 | Amust Compak Executive 816 | Accounting software, superwriter word processor, supercalc, project costing, membership system,database office costing, games, read/write foreign disk, format program | Z80A processor, 64K RAM,13 & 20 cm controller, Winchester controller, 2 serials, 1 parallel port, 13 cm screen hires, detach. keyboard, 2 800k DSDD giving 1-5 Mb stor. | The whole system lives in a Samsonite briefcase. | Ext 10 meg H/D, int. 10M 20 cm drive, opt 16 bit add-on and 256 K RAM videotex color module, doc holder, printer stand, external monitor stand. |
| C | 3600.00 | Pericomp PP/MIC504 | 64K Z80 CPU with terminal | Terminal and keyboard, CP/M | Five applications: Name & address magic worksheet, magicwriter, analyst (database), Qsort | Printer $500 Accounting $1200 (Ex Tax) |
| C | 3860.00 | FOX 2001 | IBM compatible, 8088 processor, 16-bit, 128K RAM, 2 x 360K drives, realtime clock, 2 x DS232, 1 x centronics, ports, k/board, 8 exp. slots, power supply, | graphics, sound output, MS-DOZ, V-2.0, Perfect: Calc, Filer, Writer, Speller. Peripherals: 30 cm green monitor, cables. | Full documentation on machine & software, perfect lesson disks. | Color monitor, printer, RAM upgrades. |
| C | 3870.00 | Sharp MZ3540 Desk-top Computer | MZ3540 with 2 x MFD 30 cm green monitor keyboard. | | CP/M and manual user, documentation | 80 col Dot-matrix printer, Cable for printer, color monitor. |
| C | 3940.00 | Columbia 1600 VP Portable Computer | 128K RAM, 2 x 320K disk drives,MS DOS, CP/M 86, BASIC A, macro assem. diagnostics, Perfect: writer, speller, calc, filer, fast graph, ASTNC Comm. support, etc. | | | Additional 128K RAM card printer modem. |
| C | 4200.00 | Mitsui Sord M23P | Main unit, keyboard, screen(mono) | 290K disk drives | BASIC - interpreter & compiler | |
| C | 4295.00 | Sigma/OKI Model 20 | 64K RAM, dual 5 in disk drives, CP/M oper. system, OKI BASIC, full ASCII keyboard, high speed Z-80CPU, | 30 cm color monitor, 80 cps 5 x 7, in-built dot matrix printer, dual disk drives | Star Software Package: Wordstar, Spellstar, Mailmerge, Calcstar. $1000 worth of free | Two outboard drives - total capacity can be increased to 1.12Mb, light pen, ROM |

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|---|---|---|---|---|---|---|
| | | | high res. graphics, 3 1/0 slots, RS-232C i'face, cass. rec. i'face | | software, set of operating manuals. | cartridge interface. |
| C | 4295.00 | Vector Graphic S series | Z80B, 8088 128K RAM, single floppy, power supply cables. | Green screen monitor, keyboard | CPM-86, MBASIC, GSX-86 graphics, advanced programmers package. | Extra floppy 5Mb hard disk, 10Mb hard disk, 36 Mb hard disk, MSDOS, concurrent CPM-86 |
| C | 4370.00 | Sharp MZ3540 with Graphics | MZ3540 with 2 x MFD, 30 cm green monitor keyboard. | 32K graphics, RAM Board | CP/M and manual, user documentation | Printer and cable as above, 32K graphic, RAM chips x 2, color monitor |
| C | 4387.00 | TRS-80 Model 4 Portable Computer | 64K memory, 180K disk drives (2), CP/M compatability, green phospor display. | DMP 200, 160 CPS Dot Matrix Printer. | Disk Scripsit, disk PFS:file, disk planner calc, printer cable. | RS232 kit $160, 64K memory kit $149.95, Australian accounting packages P.O.A. |
| C | 4395.00 | Apple IIe Business System | Apple IIe 128K memory | Profile 5 Mb hard disk 80 col card, monitor II catalyst software. | | Imagewriter $754 LQprinter $3100 Mouse $245 |
| C | 4600.00 | Columbia 1600-1 Computer | filer, calc, fast graph etc. color graphics card, color mon., MS DOS CP/M 86, macro assem. BASICA, Perfect: writer, speller, | | | Expansion cards |
| C | 4700.00 | DEC Professional PC325-D | Base level professional system unit which includes 16 bit 11/23 CPU with 512KB RAM, floating point adapter, dual 400KB floppy storage, plus printer port, comm. port etc. | Floor stand, monitor & cable, country kit. | P O/S V1.7 RX50 diskette | PRO/RTII operting system V5.1 $1000, color monitor $500, 10MB Winchester, controller $3500, extended bit map option & col. monitor $1100. |
| C | 4798.00 | Kaypro-10 Portable Computer | 64K CPU, 400K floppy, 10 meg hard disk, anti glare graphic screen, Software: Wordstar, Mailmerge, Calcstar, Infostar, Word Plus, Superterm, Micro Plan, SBASIC etc. | | | Printer modem |
| C | 4904.00 | EPSON QX-10 192K Multifont System | Computer with 192K RAM, FX-80 Printer, printer cable, sep. keyboard, wordstar, mailmerge, spellstar, graphics (640 x 400) | | | QX-10 color monitor $125, QX-10 color 16K board $661, FX-100 printer $1333, CIS Cobol $1292, Multifont Supercalc $222, CP/M s/ware. |
| C | 4914.00 | NEC APC-HO2 | Monochrome 128K of user memory, dual 1000K FDDs (2 Mb total), battery backed-up, 4K CMOS RAM hardware, clock/calendar. | | MSDOS & CPM-86 operating system disks & manuals. Hardware: operator's guide & system ref. guide. | Printer cable $105, additional 128K of user memory $981, hard disk $4110, graphics subsystem $891. |
| C | 4945.00 | SME Systems MPU-100 | Complete 64K, Z80 computer with and 2Mb 20 cm dual floppy drive. | Professional terminal 80 ch. x 24 line | All cables, operating system, documentation. | All CP/M software, extra floppy & hard disks to 50Mb, graphics, printers. |
| C | 4950.00 | Rank 820 | Display/processor (64K RAM) 13 cm SS/SD drives, keyboard, cabling. | Matrix printer (FX 80) | Spreadsheet | |
| C | 5000.00 | Mitsui Sord M23P | Screen (color) | 2 x 290K disk drives | Pips III - spreadsheet & database | |
| C | 5000.00 | PERICOMP PPZ80/1S Multiuser | 64K-256K | Terminals, cables. Keyboard required to run live | MP/M operating system (or Cp/M) | Various printers, software |
| C | 5265.00 | Olivetti M20 | 128K RAM, screen, 2 x 320K floppies keyboard, operating system, BASIC, manuals. | Floppy disk drives, high res. screen, 128K memory, printer cable, serial port, parallel port. | Operating system, BASIC, manuals. | 640K drives external or internal 10MB HDU, local area network, range of printers up to 64 units lge select. of industry standard software. |
| C | 5399.00 | Zenith Z-100 Desktop Computer | 8 & 16-bit processors, amber monitor, 128K memory, 2 RS-232 interfaces, 1 parallel interface, S-100 expansion buss. | Dual 13 cm floppy disk drives. | Software includes Z-DOS (MS equivalent) CPM-85. | 9 x 64K RAM chips, 256K RAM card, 10 Mb Winchester drive, S100 extender board, 20 cm floppy disk drives, Tilt base. |
| C | 5495.00 | Olympia 'People' | 128K main memory, 128K screen memory, 2 x 640K 13 cm diskette drives, CP/M 86, MS/DOS, CBasic, GSX/86, Serial Port, Parallel Port. | | Manual for operating systems and programs guide | 'Printer' application software |
| C | 5650.00 | Sharp MZ3530 20 cm System | MZ3530 with MFD, 30 cm green monitor keyboard. | Expansion unit, 20 cm interface, 20 cm dual drives, cable for 20 cm drives. | CP/M and manual, user documentation | Printer, color monitor, hard disk 10MB or 16.7MB. |
| C | 5995.00 | Vector Graphic SX series | 8086, Z80B 128K RAM, dual floppies, power supply cables. | Green screen monitor, keyboard. | CPM-86, MBASIC graphics system extension, CP/M-80 simulator. | 10Mb hard disk, 36Mb hard disk, MS-DOS 2.1 concurrent CPM-86, 8087 coprocessor. |

## CATEGORY D $6000-$12,000

| | Grp/Price($) | Machine | Items Included | Peripherals Included | Accessories Included | Options Available |
|---|---|---|---|---|---|---|
| D | 6065.00 | Sharp PC5000 Portable Computer | PC5000, CE510P Thermal Printer | CE10F Dual 13 cm floppy disk drive. | CE101F MS-DOS disk & manual, super-writer and word processor, S/W, Supercalc-2, spreadsheet. | CE100B 128K blank bubble Super Comm, (Comms), Super Planner, Plannerr/Diary, CE100M 64K RAM Expansion. |
| D | 6138.00 | NEC APC-HO3 | Color APC, 128K of user memory, dual 1000K FDDs, comm. controller, printer cont, auto power off, batt. backed-up 4K CMOS RAM and hardware clock/calendar. | | MSDOS & CP/M-86 Operating System, disks & manuals, hardware: operator's guide & system ref. guide. | Printer cable$105, Add. 128K of user memory $981, hard disk $4110, graphics subsystem $1539. |
| D | 6156.00 | Sigma/OKI Model 30 | 128K RAM, Dual 20 cm disk drives, CP/M operating system, OKI BASIC, full ASCII keyboard, high speed Z-80B ACPU, high res. graphics, 3 1/0 slots, RS-232C i'face. | 30 cm color monitor, 80 cps 16 x 16 in-built dot matrix printer, dual disk drives. | Star Software Package: Wordstar, Spellstar, Mailmerge, Calcstar, $1000 worth of free software, set of operating manuals. | ROM cartridge interface, light pen. |
| D | 6200.00 | Mitsui SORD 243-EX | Main Unit<br>Keyboard<br>Screen (Mono)<br>Cables<br>User Manual | 2 x 1.2 mB<br>Disk Drives | Basic - Interpreter & Compiler<br>SGL - Sord Graphics Languages<br>Utilities Programs<br>Basic Cartridge | 7.5MB $4000 |
| D | 6480.00 | Commodore 8000 Business System | CBM-8096-SK business computer with 80-col. green screen and 96K RAM | 8250 Dual disk drives and 1361 38 cm printer. | Calc-result spreadsheet, Superbase data base and super script word processing. | - |
| D | 6950.00 | Rank 823 | Display/Processor (64K RAM) 13 cm SS/SD drives, keyboard, cabling. | Electric typewriter, dedicated word processing keycaps. | 823 Xerox word processing software | Direct link up to Ethernet at $495 per system |
| D | 6990.00 | SME Systems Titan | Complete 256K Z80 Computer with CP/M 3.0, 3. Serial parallel ports one 1Mb 13 cm floppy, one 20Mb, hard disk, high-res. graphics keyboard & monitor. | - | Operating system, documentation. | All CP/M software, extra floppy & hard disks to 50Mb, printers. |
| D | 7250.00 | Sigma/OKI Model 20H | 64K RAM, 13 cm floppy disk drive, 7.5Mb Winchester hard disk, CP/M operating system, ASCII k'board, high speed Z-80A CPU, high res. graphics, 3 1/0 slots | 30 cm color monitor, 80 cps 5 x 7 in-built dot matrix printer, 13 cm floppy disk drive, hard disk drive. | Star Software Package: Wordstar, Spellstar, Mailmerge, Calcstar. $1000 worth of free software. Set of operating manuals. | ROM cartridge interface, light pen. |
| D | 7916.00 | TRS-80 Model 2000 | 128K memory, 720K disk drive (2), 16-bit datapath, 80186 Intel CPU | DMP 420 160 CPS Dot Matrix printer (38 cm) high res. green phoshor monitor. | Multiplan, multimate, dBase II, printer cable. | Color monitor, $1149, Digimouse $149.95, 10 Mb HD $2699 |
| D | 7985.00 | SME Systems MPU-700 Multi-proc | Complete 64K Z80 computer, expandable to 7 users, CP/M 2.2, 2 serial, parallel port, 1Mb 13 cm, one 20Mb hard disk. | Professional terminal, 80 ch x 24 line. | All cables,operating system, documentation. | All CP/M software, extra floppy & hard disks to 512 Mb, graphics printerskl, additional user - processors (Max 7). 16-bit processors. |
| D | 8035.00 | Apple Lisa 2/5 Imagewriter | Lisa 2, built-in screen, built-in 400K, disk 9 cm, Mouse, 512K mem. | Profile hard disk 5Mb | Lisa Calc, Lisa Draw, Lisa Graph, Lisa Write, Lisa List, Lisa Project. | 512K memory $1995, LQ printer $3100. |
| D | 8488.00 | Zenith Z-100 Low Profile | 8 & 16 bit processor, color monitor, 128K memory, 192K color board. | 13 cm floppy disk, 10Mb Winchester, Winchester, 1 RGB color monitor | Software includes Z-DOS (MS equivalent). CPM-85 | 9 x 64K RAM chips, 256K RAM board, 20 cm floppy drives, tilt base. |
| D | 8890.00 | Olympia 'People' Hard Disk | 128K main memory, 128K screen memory, 640K 13 cm diskette drives, CP/M 86, MS/DOS, CBasic, GSX/86, serial port, parallel port. | - | Manual fort operating systems and programs guide | 'pr.nter' application software. |
| D | 9489.00 | Centinet 208 | 64K Model 208<br>Wordstar Supercaic BASIC | Dual 20 cm drives (2.4Mb), amber monitor, spinwriter, printer, cable. | Wordstar manuals, Supercalc manuals | Range of printers, Winchester drives, tape drives.<br>All CP/M software packages. |
| D | 10135.00 | Apple Lisa 2/5 Imagewriter | Lisa 2, built-in screen, built-in 400K, disk 3.5, Mouse, 512K memory | 10Mb hard disk | Lisa Calc, Lisa Draw, Lisa Graph, Lisa Writer, Lisa List, Lisa Project. | |
| D | 10929.00 | Centinet 213 | 64K Model 208 | 20 cm drive (1.2Mb) 512K memory | Wordstar manual. | Ranger of printers, Winchester |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | Wordstar BASIC | drive, amber monitor, solnwriter printer, cable. | | | drives, tape drives. All CP/M Software. Local Area Networks |
| D | 11900.00 | Rank 823(10Mb) | Display/Processor (64K RAM) 10Mb drive, 82cm DS/DD back-up drive, keyboard, cabling. | Electric Typewriter. | 823 Xerox word processing software DBase II, Multiplan, CBasic, Basic 80, Tty Comms. | | Accounting at $250 per module. Direct link to Ethernet at $495 per system. |

**CATEGORY E OVER $12,000**

| Grp | Price($) | Machine | Items Included | Peripherals Included | Accessories Included | Options Available |
|---|---|---|---|---|---|---|
| E | 17263.00 | TRS-80 Model 16 Xenix Multiuser | 256K memory, 1.25 meg. floppy disk 15 meg. hard disk, MC68000 16-bit CN, Z80A 8-bit CN, green phosphor display, b/w terminal display | DT 1 data terminal (2), DMP 2100 180 CPS, letter quality dot matrix printer. | profile, printer cable, terminal cables. | Aust accounting packages P.O.A. 3 extra terminal cards $349. data terminal $1299, daisywheel printer $2279, 15 Mb hard disk $3499. |
| E | 18523.00 | Dolphin 100 x SMH3/26 | Dolphin 3-user computer system 3 term. with sep. k/boards, 26Mb hard disk drive, 1.2Mb 20 cm, floppy disk drive, 4 processors, cables, box 10 disks. | Epson RX-80 printer & cable, 2000 sheet box of paper | Wordstar | 200 cps multimode printer Epson LQ1500 $2130,D/wheel fr. $845,timecosting s/ware $1500,Hard disk drive with 5M rem. cartridge $1665 etc. |

## CATEGORY B $1,500- $3,000

### Tough Turkey

This is a real toughie of a category because of a company called Osborne.

Late in 1983 the Osborne Computer Corp hit big financial trouble and looked like becoming a casualty of the 'too big too soon' syndrome. The quality and value for money of Osborne's hardware – particularly the popular transportable Osborne I – wasn't the problem. It was poor corporate cash-flow that brought Adam Osborne's empire to its knees.

That's the bad news. The good news is that Osborne is back in business, thanks to an infusion of money and a reshuffling of the hierarchy – though nobody can say with certainty what the future holds. That doubt over the long-term survival of the Osborne organisation made the $1500-$3000 category difficult.

Here's what the *Your Computer* panel had to say:

"The Osborne 1 at $2195 represents the best hardware/software value for money on the market.

"The Osborne is a 64K machine with two built-in disk drives, a full QWERTY keyboard with numeric pad, a small, but usable green screen monitor and a collection of some of the best business software available, including Wordstar/Mail-merge, Supercalc and CBASIC/MBASIC languages. Additional software is freely available. The most recent Osborne 1 models have a full 80-column display and run double-density disks.

"For business use, a 30 cm monitor is a must, though the built-in green screen can be used for short periods. The Osborne is a transportable machine, but hardly a featherweight.

### Orange Light For Osborne

"If there was no doubt over the future of the company, the Osborne 1 would walk this category in, but to buy one now means taking a certain (if limited) gamble.

"There are some 6000 Osborne owners throughout Australia and the various user groups are strong. Even if the worst does happen and the Osborne name fades from the scene, service and parts support shouldn't be a problem. Already the Hills organisation is providing service contracts and spares.

"The risk of becoming a computer orphan does exist ... but if we were in the market for a $1500-$3000 package, we'd probably take the punt.

"For the non-gamblers, other machines worth a good look in this price range are the Microbee APC at $2172, and the new Apple IIc. The former is a 64K RAM machine with a single 400K disk drive (a second drive is a $400 option) a green screen monitor, Admate printer and cables. Software includes the ubiquitous Wordstar, Multiplan spreadsheet, Microsoft BASIC and CP/M 2.2 operating system.

"The latter, the Apple IIc, is so new we haven't had a good look at it yet, but it's a transportable, it wears the Apple logo and sells for $1775. For that money you get 128K RAM and a built-in disk drive, 20 hours worth of tutorial disks and the ability to run software designed for the Apple II. A 30 cm mono monitor is a $335 essential extra, though the IIc can be plugged into a television set."

## CATEGORY C $3,000- $6,000

### It's a Pushover

Despite a few minor (and now cured) teething problems, the three to six grand bracket, domain of the small businessman, was no contest.

According to the *Your Computer* boffins, the Morrow MD-11 Hard Disk machine at $5998 (tax paid) represents sensational computer value, with speed and performance the equal of anything twice the price.

What follows could safely be classified as a rave review:

"George Morrow has been one of the innovators, one of the pioneers of the microcomputer business. His latest machine, the MD-11, launched in the USA last November and now just arrived Downunder, is simply unbelievable.

### Brains And Lots Of Software!

"Consider what your $5998 buys. First, 128K of RAM, with 11 megabytes ▷

# Bits by Bucks

of hard disk – that's 11,000K without resorting to a single floppy.

"The combination of hard disk and Morrow's Controlled Memory Access means average random access time is a mere 95 milliseconds. That's very, very fast!

"An intelligent terminal is part of the package, with detachable QWERTY keyboard, numeric pad and nine user-programmable function keys.

"The MD11 has one centronics parallel port, two RS232 ports and a high-speed RS422 connector for high speed communications.

"In terms of hardware specification for the price, the MD-11 is truly Deluxe ... but that's not the whole story, not by a long shot.

"Consider the software package included in the price. There's CP/M 3.0, the most up to date version of the most popular operating system in the business; NewWord word processing, which is very similar to Wordstar, but with the added feature of an Undo function which can recall unintentionally deleted work; Correct-It, which is one of the best spelling checkers we've seen; Supercalc spreadsheet; an easy to use bookkeeping program called Quest; Microsoft BASIC and a pair of humdingers called Pilot and Personal Pearl.

Pilot can be used by the computer novice to substitute for many CP/M commands. In fact, it almost obviates the need to learn CP/M. Personal Pearl is a database manager. Maybe it's not as good as dBaseII, but it sure is a lot easier to learn and operate.

### Plain, But Efficient

The Morrow is a very plain machine, almost boring in its apparently conventional specification – but it is an ideal integration of fast, proven components which produces one of the best performers in the market. At the price, it's a steal.

Of course, if you really want to go 16-bit (an upgrade board is available for the Morrow, by the way) you could look at the base model of *YOUR Computer's* 1983 Personal Computer of The Year, the NEC APC.

The monochrome, 128-Kbyte model falls within this price category, and is worth looking at. However, the high-resolution colour graphics that make the APC so attractive will cost you extra.

## CATEGORY D $6,000-$12,000

### Biased Best

The *YC* people are decidedly biased in this area, recommending the systems they use (you know how it is – everyone has to justify his purchase). They're CompuPro System 816s, and I've never heard of them either!

However, they tell me it's worth getting on the queue (you can rarely get one in less than six weeks, and sometimes have to wait three months) for one of these, because they're solid, reliable workhorses that have real power and ultra-expandability.

The machine in question here is the System 816B, which comes with a dual processor (you don't have to decide between eight and sixteen bits; you can run both), 256K of static (read reliable) RAM, nine serial ports to give plenty of room for multi-user expansion, a floppy disk controller hooked up to two 1.2 megabyte 20 cm drives, and a system clock/interrupt controller board.

With all that, you still have 12 slots left in the S100 box for expansion: add a hard-disk controller, up to a megabyte of memory, up to two megabytes of M-Drive (memory that behaves like a superfast disk drive), more serial ports – whatever you like.

### Crowd Pleaser – With Hard Disk

The base machine comes ready for multi-user operation, and standard software includes MP/M-816 (the dual-processor multi-user operating system), CP/M-816, Supercalc 2, dBase II, WRITE, Hyper-Typer and Field Companion. We warn you here and now, however, that it is silly to attempt multi-user operation on any floppy disk system, unless you are extremely patient – treat this machine as a super-powerful single-user device and when your needs grow, add a hard disk and extra terminals.

You can run up to 13 terminals and four printers by adding more memory and extra serial ports, though that would be stretching the friendship – six to seven terminals and two printers is more practical.

### What's In A Name?

If you want a 'name' computer in this price class (though the *YC* people tell me Bill Godbout was making state-of-the-art micro gear before IBM knew what a micro was) you could look at the IBM PC/XT, the NEC APC, Texas Instruments' Professional or Tandy's Model 2000 in their deluxe guises.

The experts tell me the IBM is a dull sort of box, but they point out the massive third-party support for it edges it into the 'best-buys' class.

## CATEGORY E OVER $12,000

### Over To You

More self-justification from the *YC* boffins: they say a hard-disk CompuPro is the way to go here. The aforementioned system, with hard disk controller hooked up to 40 megabytes, costs around $16,000.

However, they admit that in this league they shouldn't really be telling people what to do. If you're shopping in this price range you're looking for a *system*, not just a computer, and you should search long and hard to ensure you get the right software/hardware combination for your business.

Remember Plan B: find the software you need, then get the best hardware you can afford to run it on. Pay particular heed to the people who are trying to sell to you: you need to be confident they can support the product, and support *your business*.

Local manufacturers are quite active in this area. Two machines worth a further look are the Labtam (we haven't played with one, but it looks very impressive on paper and we've heard good reports) and AED's Supercomputer.

Tandy has a multi-user machine at around $17,000. It uses Microsoft's UNIX-like Xenix operating system, and should also be worth closer examination. ❑

# User Groups

*This computer club file tells you who else has a computer like yours, and who can give you the good oil on a computer you would like to buy.*

## A.C.T.

**ACT Micro 80 Users Group,** Bill Cushing, 10 Urambi Village, Kambah, 2902, 062 313630.

**ACT Vic 20 Users Association,** Chris Groenhout, 25 Kerferd St, Watson, 2602, 062 41 2316, Meetings 1st Monday each month at Boy's Grammar Scout Hall, Red Hill, 7.30 onwards.

**ACTARI,** Chris McEwan, Co-Ordinator, ACTARI, P.O. Box E112, Canberra, 2600, 062 88 7861.

**Apple User Group (ACT),** Jeff Brock, 1 Buckley Circuit, KAMBAH, 2902, 062 313630.

**Australian ZX80 Users Group(AZUG),** David Brudenall, 19 Godfrey Street, Campbell, 2601, for ZX80/Microace owners.

**Canberra ACT Sirius User Group,** Jim Bland, 062 81 2824, 062 81 2832.

**Canberra Compucolor Club (CCC),** Meets 7.30 on first Sunday of every month at the offices of Digital Equipment, 28 Lonsdale Street, Braddon ACT.

**Canberra Microbee Users Group,** Hugh Gibson, Microbee Store, Level 1, Cooleman Court, Weston, 2611, 062 88 6384.

**Canberra Microbee Users Group,** Adrian Van Wierst, 9 McGowan Street, Dickson, 062 49 7030.

**Canberra Micro-80 User Group,** Milt Cottee, 33 Crawford Cres, Flynn, 2615, 062 58 8822, meetings third Monday each month 7.30 pm in the small theatrette, Reid TAFE, for System 80, TRS-80 etc.

**Canberra Osborne Group,** c/oGeoff Cohen, P.O. Box 136, Kippax, 2615, 062 54 7608.

**Micsig,** Registrar, P.O. Box 446, Canberra, 2601.

## N.S.W.

**Albury-Wodonga Dist Mbee U.G.,** Eric Eulenstein, 202 Kooba St, Albury, 2640, 060 25 1601.

**Apple Users Disk Exchange Club,** Peter Lapic, 45 Malabar Street, Canley Vale 2166.

**Apple Users Group,** Colin Rutherford, P.O. Box 505, Bankstown, 2200, meets 6.30 pm second Monday of each month (Tue after pub. hol.) at Sydney Grammar School, Stanley Street, Sydney, 02 520 0926.

**Atari Computer Enthusiasts,** Tony Reeve, PO Box 4514, Sydney 2001.

**Ausborne,** Brian Carney, 477 4492, P.O. Box C530 Clarence Street, Sydney, 2001, meetings third Wednesday each month at 6.30 in the North Shore Council Chambers, for Osborne users.

**Ausbug,** Stephen Ford, P.O. Box 62, Londonderry, 2753.

**Australasia ZX80 Users Group,** Tony Mowbray, 87 Murphys Ave, Kieraville, 2500, 042 28 5296, for ZX80/81 Microace owners.

**Australasian ZX80 Users Newsletter,** 87 Murphys Ave, Kieraville, 2500.

**Blue Mountains Microbee Computer Club,** Roger Cooper, 047 58 7238.

**Blue Mountains Computer Club,** Eric Lindsay or T. Macindoe, C/- P.O. Faulconbridge, 2776.

**Broken Hill Microbee Users Group,** Peter Cotter, 533 Radium Street, Broken Hill, 080 881621.

**Central Coast Computer Club,** Max Maughen, P.O. Box 36, Ettalong Beach, 2257, 043 24 2711, 1st and 3rd Tuesday every month at Applied Technology, West Gosford, for all types of computer.

**Commodore Users Group,** John Guidice, G.P.O Box 4721, Sydney, 2001.

**Compucolor Users Group,** David Brown, 91 Regent Street, Chippendale, 2008.

**Cumberland Computer User Group,** S. O'Neil, 02 682 3851.

**DEC Personal Computer Special Interest Group,** Marion Rhydderch, DEC Australia, Northern Tower, Chatswood Plaza, Railway Street, Chatswood 2067, 02 412 5252.

**A.P.F. Users Group,** Norm McMahon, 288 Kissing Point Road, TURRAMURRA, 2074, 02 44 2645.

**Hawkesbury MicroBee Computer Club,** Bruce Rennie, 045 67 7329.

**HP Desktop Computer Users Group,** Dr. R. W. Harris, CSIRO Division of Mineral Physics, PMB 7, Sutherland 2232, 02 543 3460

**Hunter U. G.- All Microcomputers,** Secretary, P.O. Box 39, BROADMEADOW NSW, 2298, Meets on the second Wednesday of each month in Room 308, building W, University of Newcastle at 7.45pm. Membership is primarily Apple II orientated, but anyone with interest in micros welcome.

**Illawarra Microbee Computer Club,** Ronald Read, 49 Beatus Street, Unanderra, 2526.

**Illawarra Super 80 Users Group,** Jim O'Grady, Chairman, P.O. Box 1775, Wollongong, 2500.

**Kaypro Users Group N.S.W.,** Harry Richards, 4/2 Bortfield Drive, Chiswick, 2046, 02 713 1585, meets 2nd Tuesday each month at 8.00 pm in the Burwood R.S.L.

**Sydney Lotus 1-2-3 User Group,** Ron Pollak, (02) 29 5316.

**Macarthur Computer Association,** J Napier, 23 Athel Tree Crescent, Bradbury 2560, meets first Monday each month at Airds High School, ▷

# User Groups

Briar Road Campbelltown at 7.30 each month, all machines are catered for, 046 25 2055.
**Macquarie Microbee Users Group,** Brian Thompson, meetings first Monday each month at Denistone East Primary School at 7.30 pm, 02 85 1659 after hours.
**MEGS (Microcomputer Enthus. Group),** John Whitlock, P.O. Box 1309, Chatswood 2067. Meetings third Monday each month at rear of St. Andrew's Presbyterian Church, 37 Anderson Street, Chatswood, (02) 638 1142.
**Mi Computer Club,** Norma Jackson, P.O Box 21, Waterloo, 2017, 02 662 8888.
**Microbee Users Club (Broken Hill),** Peter Cotter, 533 Radium Street, Broken Hill 2880, 080 88 1621.
**Newcastle Microbee Users Group,** Lee Osman, 12 Cleverton Close, Warners Bay 2282, 049 48 8813.
**Newcastle Microcomputer Club,** Angus Bliss, PO Box 293, Hamilton 2303, meetings 2nd and 4th Monday each month at room G12, Physics Building, Newcastle Uni, 049 67 2433.
**N.S.W. Primary School Microbee Users Group,** Mr Peter Stretton, c/- Hunters Hill Primary School Alexandra Street, Hunters Hill 2110.
**N.S.W. 6800 Users Group,** 27 Georgina Ave., Keiraville, 2500.
**Northern Beaches Vic User Group,** E. Tuxford, 161 Barrenjoey Rd., Newport, 2106, Ph 997 2467, Community Centre (If We're lucky).
**Northern N.S.W MICC Chapter,** Alen Hartley, Dundurrabin via Dorrigo, 2433, 066 57 8160.
**N.S.W Peach User Club,** Daniel Soussi, 02 698 8286, weekly meetings on Saturday from 2pm at 'Cybernetics Research' 120-122 Lawson St Redfern.
**OSI Users Group,** Nigel Bisset, 02 411 7142.
**Pocket Computer Users Club,** George Antonijevic, 02 683 4296, for those interested in pocket computers, whatever the brand. Meetings held on the first Wednesday of each month at 7.30pm at the 'Woodstock' Community Centre, Church St. Burwood.
**Sorcerer Users Group,** P.O. Box E162, St James, 2000, meetings 1st Tuesday each month at 7th Floor Datec House, 220 George Street, Sydney at 7.30pm.
**Southern Districts Commodore Users Group,** Lex Toms, 602 8691, 3 Lucille Crescent, Casula 2170, Meetings 1st and 3rd Wednesday each month, API Hall Currajong Road, Prestons.
**Sutherland Super 80 Group,** Jim Traeger, 02 525 2018, Super 80.
**Sydcom 64 (C64 User Group),** Andrew Farrell, meetings first Tuesday of each month at 6.30 pm above Computerwave, George Street, Sydney, 02 99 2640.
**Sydney Forth Group,** Peter Tregeagle, 10 Binda Road, Yowie Bay, 2228, 02 524 7490, Forth Computer Language.
**Sydney MicroBee Users Club,** Colin Tringham, 92 6408, PO C233, Clarence St, Sydney 2000, Meetings 3rd Sat each month 1-5 pm McMahons Point Hall, Blues Point Rd North Sydney.
**Sydney Peach User Group,** Ben Sharif, 261 Northumberland Street, Liverpool, 2170, 02 601 8493.
**Sydney TRS-80 Users Group,** meetings 2nd, 3rd and 4th Saturday of each month at Botany, phone (02) 666 4716 bus hours.
**T.I. Sydney Home Computer U.G.,** P.O. Box 149, Pennant Hills, 2120.
**Wagga Microbee Users Group,** John Simmons, 47 Undurra Drive, Glenfield 2650, 069 31 1302, meetings 1st and 3rd Tuesdays each month in the Tolland-Glenfield Neighbourhood Centre at 8.00pm.
**Wizzard User Group,** John Mifsod, 150 Bouganville Road, Blackett, 2770, 02 628 0801.
**ZX-Spectrum Users Club,** Craig Kennedy, P.O. Box 466, Epping, 2121.

## VIC

**Apple Users Society of Melbourne,** D. Halprin, 03 387 3221, PO Box 43, Forest Hill 3131.
**AT Microcomputer Club,** Grant Forest, 03 8792257ah, 03 699 2888 bh. This club has been formed for people interested in the Applied Technology DGOS Z80.
**Atari User Groups Melbourne,** Kelvin Eldridge, P.O. Box 173, 3073.
**Australian Forth Interest Group,** Tony Latermore, P.O. Box 704, SALE, 3850, 051 44 2011.
**Australian North Star Users Assoc.,** P.O. Box 194, WANGARATTA, 3677.
**Ballarat Computer Users Group,** Publicity Officer: John Preston, 053 31 4363.
**Billanook Computer Forum,** Mr Maurie Canterbury, Cardigan Road, Mooroolbark 3138, (03) 725 5388.
**BUG 80 (Burwood Users Group),** P.O. Box 46, BLACKBURN SOUTH, 3130.
**Chip 8, 6800, 1802 User Group,** Frank Rees, 27 King Street, BOORT, 3537.
**Compucolor Users Group,** L Ferguson, 12 Morphett Avenue, ASCOT, 3342.
**COMX-35 Users Group,** Adam Carter, 2 Dougand Circuit, Dingley 3172. Monthly newsletter. Write for further information or send $15 to above address. SSAE preferred. Interstate members welcome.
**DEC Personal Computer Special Interest Group,** see NSW entry.
**Forth Interest Group,** Lance Collins, P.O. Box 103, CAMBERWELL, 3124, (03) 29 2600, Meets on the first Friday of the month.
**Geelong Computer Club,** Peter McKeon, P.O. Box 93, GEELONG, 3220.
**IBM & Columbia Computer Users Club,** Giles Bray, 22/11 Auburn Grove, Hawthorn East, 3123, 82 7632, 2nd Tuesday each month, 7.30 at the Victorian College of Pharmacy.
**Kaypro Users Group of Victoria,** George Kunz, PO Box 159, Forest Hill 3131, 03 857 5462, meetings fourth Sunday each month at Burwood State College Community Resources Centre at 2 pm.
**KAOS (Ohio Scientific),** David Anear, 49 Millewa Crescent, DALLAS, 3047.
**Latrobe Valley Colour Computer U.G.,** George Francis, 31 Donald Street, Morwell, 3840, 22 1389, for TRS-80 & MC10 users.
**Melbourne Atari Computer Enthusiast,** PO Box 133, Mulgrave North 3170, meetings held on first Sunday of each month at 11.40am at Monash University Rotunda.
**Melbourne Lotus 1-2-3 Users Group,** Robert Taylor, (03) 267 4800.
**Melbourne MicroBee Users Group,** Pres Grant Forrest, PO Box 157, Nunawading 3131.
**Melbourne PC User Group,** Stephen Wagen or Christopher Leptos, c/o Pannell Kerr Forster, 14th Floor, 500 Bourke Street, Melbourne 3000, 03 605 2222.
**Melbourne Peach Users Group (MPUG),** P.O. Box 191, Rosanna, 3084, 03 434 2541.
**Melbourne Super 80 Users Group,** Hon. Sec. Victor Shuttleworth, 03 723 2713.
**MICOM,** Microcomputer Club of Melb., P.O. Box 60, CANTERBURY, 3126.
**National Mutual Micro Users Group,**

R Prewett, NMLA, PO Box 2830AA, GPO Melbourne 3001, for National Mutual staff.
**National Sinclair User Group,** P.O. Box 148, GLEN WAVERLEY, 3150.
**National ZX80 Users Club,** 24 Peel Street, COLLINGWOOD, 3066.
**NEC Portable User's Group,** D Green, meetings second Wednesday of each month at Myers Computer Centre Lonsdale Street at 7.30 pm, (03) 611 3380.
**Northn/Westn Sub. Comp. Users Group,** John King (Secretary), 284 Union Road, MOONEE PONDS, 3039, 03 338 9304, Contact CP/M Data Systems.
**Peninsula Computer Club,** George Thompson, 3 Patterson Street, Bonbeach, 3196, 772 2674, 2nd Tuesday each month at Chisholm College, Frankston, many types of computers are catered for.
**Sharp Computer Users Association,** The President, 7 Faye Street, East Burwood 3151.
**Sorcerer Computer Users (Australia),** Secretary, G.P.O. Box 2402, MELBOURNE, 3001.
**TI-99/4A Users Group Melbourne,** Wayne Worladge, 123 Ashburn Grove, Ashburton, 03 25 1832.
**The Motorola User Group Soc. (MUGS),** Clive Allan, 11 Haros Avenue, NUNAWADING, 3131, 03 878 1298, Group is interested in 6800/02/09 based computers, particularly if running Flex although this is not a prerequisite to join.
**Vic. Assoc. of Computer Educators,** Arthur Totrall, P.O. Box 69, WHITTLESEA, 3757.
**Victorian VZ200 User Group,** Luigi Chiodo, 24 Don St., Reservoir, 3073, 03 460 3770.
**Victorian Wizzard Users Group,** Barry Klein, 24 Russell Street, Bulleen 3105.
**Yarrawonga Computer User Group,** Chris Younger, 057 44 3859, 10 Witt Street, Yarrawonga, 3730, for all machines.
**ZX81 Software Exchange,** C/- Chips Taens, 5 Muir Street, MT. WAVERLEY, 3149.

## QLD

**Apple-Q the Brisbane User Group,** The Secretary, P.O. Box 721, SOUTH BRISBANE, 4101, Has User Group days every third Sunday of month at Hooper Education Centre, Kuran St. Wavell Heights. Centre is open from 8.30am till 4.30pm, members encouraged to bring Apple along.
**Australian Sirius Users Group,** P.O. Box 204, CHERMSIDE, 4032, 07 350 2611, Looks after the needs of Sirius One and Victor 9000 computer users. For membership form write to above address.
**Basic User Group,** Chris Lucey, Cranium Computers, 34 Lawless Street, Blackwater 4717.
**Brisbane Super 80 Users Group,** Gary Gatfield, 08 355 3173.
**Brisbane Youth Computer Group,** A. Harrison, P.O. Box 396, Sunnybank, 4109.
**Commodore Computer Users Group QLD,** Mrs D D Dillan, P.O. Box 127, STONES CORNER, 4120.
**Commodore Users Group,** John Egan, P.O. Box 274, SPRINGWOOD, 4127, 07 287 2705, Is for owners of Pet/CBM and Vic-20 machines. Meetings held on the first Tuesday of the month at 130 Petrie Terrace, Brisbane.
**Computer Owner's Group,** Betty Adcock, 42 Lucan Ave, Aspley, 4034, 263 4268, 2nd Wednesday each month, 7.45 pm, all kinds of computer are catered for.
**DEC Personal Computer Special Interest Group,** see NSW entry.
**Gold Coast Microbee User Group,** Col McLaren, 1-100 Imperial Parade, Labrador, 4215, 075 314610, meetings first Sunday each month, 3.00 at the Southport High School.
**IREE Microcomputer Interest Group,** N Wilson, P.O. Box 811, ALBION, 4010.
**Mackay Microbee User Group,** Geoff Gehring, Box 230, Mackay, 4740, 079 42 3214.
**Osborne Users Group of Qld Uni,** Glen McBride, meetings 2nd Thursday each month open to all, 07 371 4243.
**Superboard Users Group,** Ed Richardson, 146 York Street, NUNDAH, 4012.
**Tandy, Apple, Commodore UG,** Chris Lucey, 34 Lawless Street, Blackwater 4717.
**The Microcomputer Society,** The Secretary, P.O. Box 580, FORTITUDE VALLEY, 4006, Meetings are held on the second Friday of each month in the Old Town Hall, corner Vulture and Graham Streets, Sth Brisbane. Meetings start at 7.30pm if main gate is closed use the back stairway.
**Townsville MicroBee User Group TMUG,** Chris Hayes, 077 796065ah, Meets at 7pm on the second Monday of the month. Another 'user' meeting is held later in the month. Meetings are held at Town and Country Computers, CTL Centre, Anne St. Aitkenvale QLD.
**TRS80/System 80 Interest Group QLD,** 396 2998, Meets on the first Sunday of each month at 21 Rodney St, Lindum, at 2 pm.
**ZX 81 Club,** P. Carswell, 22 Braud Street, BUNDABERG, 4670.

## S.A.

**AACC, Adelaide Atari Computer Club,** meets at Gilles Street Primary School, City, on first Monday (second if first is on Public Holiday) of each month. Secretary, PO Box 333, Norwood, SA 5067.
**Adelaide Lotus 1-2-3 User Group,** Paul Wragg, Pannell Kerr Foster, GPO Box 1969, Adelaide.
**Adelaide Micro User Group,** R. G. Stevenson, 36 Sturt Street, Adelaide, 5000, for TRS-80 and System 80 Users.
**Adelaide Osborne Group,** Russell Barter, The Secretary, 410 Regency Road, PROSPECT, 5082.
**Alice Springs Microbee Users Group,** Douglas Craigie, c/- PO Box 3230, Alice Springs 5750.
**Beebnet,** P.O. Box 262, KINGSWOOD, 5062, The group intends to produce a newsletter on a monthly basis. It is interested in any software producers or distributors who would be interested in serving the groups market requirements.
**CBM/VIC Users Group Of N.T.,** Ian Diss, 089 27 9208.
**Commodore/Vic Computer Users Assoc.,** Mr Eddie Hann, 13 Miranda Road, PARALOWIE, 5108, The SA branch meets monthly.
**Compucolor-Intecolor User of S.A.,** P.O. Box 86, Torrensville, 5031, 08 352 3296.
**Darwin Microbee Users Group DBUG,** Felino Molina, P.O. Box 3111, DARWIN, 5794, 089 82 5613bh, 089 88 1455ah.
**DEC Personal Computer Special Interest Group,** see NSW entry.
**IBM-PC S.A. Users' Group,** PO Box 68, Walkerville 5081.
**Kaypro User Group,** Myles Wakeham 100 Pirie Street, Adelaide, 5000, 08 223 6333, meetings 1st Tuesday each month.
**Microbee Users Group of S.A. MUGSA,** The Secretary, GPO Box 767, Adelaide 5001. Terrace, Lower Mitchum, 08 277 7697.
**N.T. 80 Computer User Group,** R T O'Brien, 433 McMillans Road, JINGILI, DARWIN, 5792.
**S.A. Commodore Computers U.G.,** Eddie Hann, The Secretary, P.O. Box 427, North Adelaide, 5006, 258 6367, meetings second Tuesday each

month, 7.30 at Royal Caledonian Hall, 379 King William St, Adelaide.
**S.A. Hitachi User Group,** Cliff Hignett, 45a Ormond Ave, Daw Park, 5041, 08 274 9341.
**S.A. Microprocessor Group Inc SAMG,** The Secretary, P.O. Box 113, Plymton, 5038, 08 278 7288.
**Sorcerer Users Group of S.A.,** Don Ide, 14 Scott Road, Newton 5074.
**South Australian Apple Users Club,** The Secretary, SAAUC, C/- The Bookshelf, 169 Pirie Street, Adelaide, 5000.
**South East Computer Enthusiasts' Group,** Glenn Mibus, 3 Millard St, Mount Gambier 5290, 087 25 1046, meetings 2nd and 4th Tuesday of each month from 6.30 at Mt Gambier High School Computer Room, for all machines and interested parties.
**The Microcomputer Assoc. of the N.T,** Andy Smith, Darwin Community College, CASUARINA, 5792.

## W.A.

**Agriculture Users Group, c/-** Mr R Fenwick, Dept. of Agriculture, Albany 6330. For farmers and the agriculture service industries.
**CU WEST WA Compucolor/Intecolor U.G,** John Newman, 8 Hillcrest Drive, DARLINGTON, 6070.
**DEC Personal Computer Special Interest Group,** see NSW entry.
**KAOS-W.A.,**Gerry Ligtermoet, 09 450 5081, 39 Cloister Ave, MANNING, 6152, for Ohio Scientific Users.
**OSWEST-Osborne Users Group of W.A.,** 09 330 3439.
**Kaypro User Group of WA,** Ainslie Sharpe, PO Box 91, Claremont 6010, 09 384 5511, meetings 2nd and 4th Mondays of each month in the Canteen of the Department of Agriculture, Jarrah Road, South Perth.
**Perth 80 Users Group,** C Powell, 09 457 6849, for System 80 and TRS 80 Users.
**Perth Hitachi Peach Club,** The Secretary, 1 Charf Court, Riverton, 6155, 09 367 5880, for Hitachi Peach & 6809s.
**Sorcerer Computer Users of Aust.,** The Secretary, 90 King George Street, PERTH SOUTH, 6151, 09 367 6351.
**Super 80 Users Group Perth,** Garry Black, 19 Bendigo Way, CITY BEACH, 6015, 09 385 8813.
**The W. A. Atari Computer Club,** Mr Alf Gaebier (Secretary), P.O. Box 7169, Cloisters Square, PERTH, 6000.
**W.A. Microbee Club,** Mike Oborn, 09 447 5366.
Vic-Ups, G. Padfield, 09 451 4629.
**W.A. Wizzard Users Group,** John REid, 13 Wenlock Road, Wattleup 6166, 09 410 2359.
**W.A. ZX Users Group,** Phil Taylor, 09 328 4111, (bh).
**WA University Computer Club,** 2nd Floor, University of WA, Guild Building, 09 386 1455.

## Tas

DEC Personal Computer Special **Interest Group,** see NSW entry.
**Devonport Computer Interest Group,** John Steveson, R.S.D 422, SHEFFIELD TASMANIA, 7306, 004 92 3237.
**Spectravideo Computer Users Group,** Mr W. P. Decket, 48 Heather Street, LAUNCESTON, 7250, 44 4836, Membership to the club costs $15 which entitles members to a newsletter and to discounts on computer equipment.
**Tasbeeb,** John Hannon, PO Box 25, North Hobart 7000, meetings first Monday each month at Elizabethan Matriculation College in D Block at 8pm, 002 34 2704.
**Tasmanian T.I. User Group,** Co-ordinator, 1 Benboyd Court, ROKEBY, 7019, 002 29 4009, meetings third Sunday of each month at University of Tasmania, room 373.
**TAS-Micro,** Peter Deckert, Unit 1/456 West Tamar Road, RIVERSIDE, LAUNCESTON, 7250.
**Tasmanian Commodore Users Assoc.,** Vincent T. Staggard, The Secretary, G.P.O. Box 391D, Hobart, 7000, 002 72 0295, Commodore and others.
**Tasmanian OSI User Group,** David Tasker, 111 Bass Highway, WESTBURY, 7303.

## N.Z.

**1802 Users Group,** P.O. Box 6210, AUCKLAND, NEW ZEALAND, For those who own an ETI-660 or a COSMAC VIP, you can contact the 1802 Users Group. Be kind and send them a return addressed envelope and some International Reply Coupon.
**Nelson Vic Users Group,** Peter Archer, Nelson VIC Users Group, C/ o P.O. Box 860, Nelson N.Z., for Vic and Commodore.
**Wellington Microcomputer Soc. Inc,** Lindsay Williams, 2 Pope Street, PIMMERTON, NEW ZEALAND.
**ZX81 Club,** R Skelton, C/- Harbourside Orchard, WAIUKU NEW ZEALAND.❑


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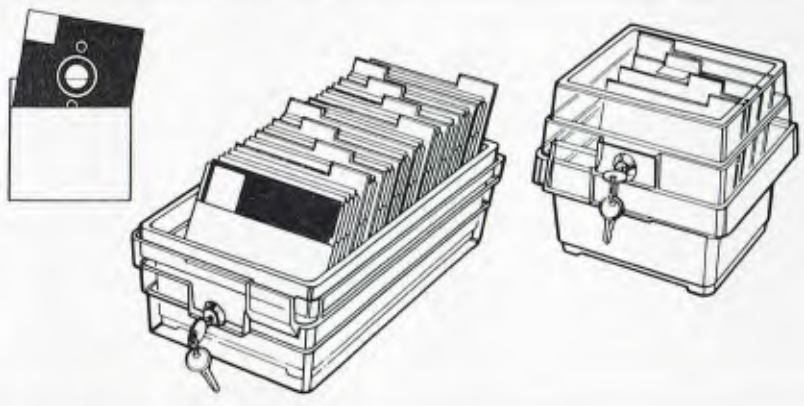

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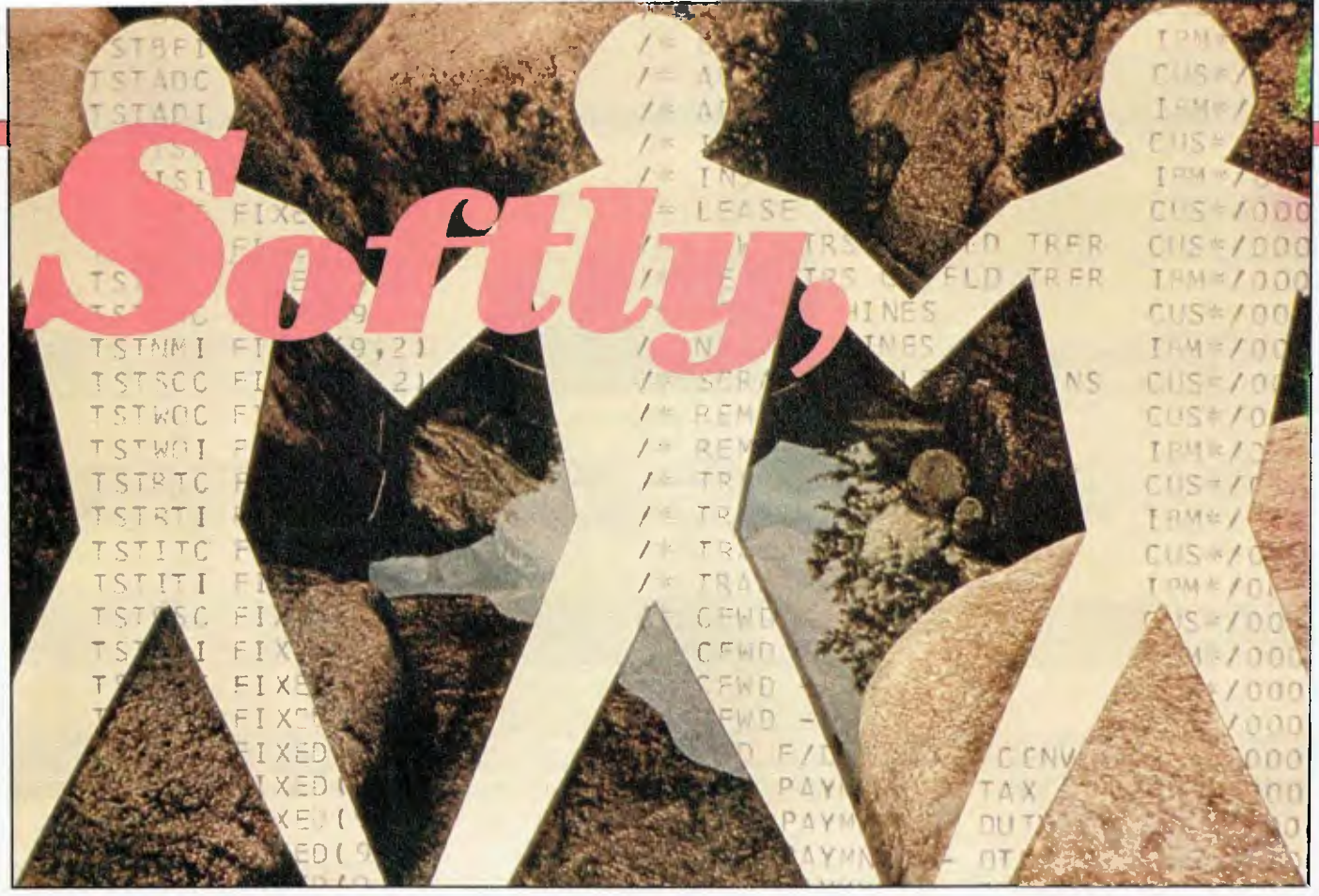


# Softly,

*The most commonly used programs on any computer, apart from games, are word processing and 'spreadsheet' packages. Once you get the hang of what these kinds of program can do for you, it'll seem amazing that you ever managed without them.*

By Natalie Filatoff

Throughout this publication you'll find analogies describing what a computer without software can be compared to: an unplugged washing machine, a cassette player without a cassette, a turntable without an amplifier or records to play. It's true. Without software, the computer is soft in the head, dumb. It can, like some managing editors before their first cup of coffee in the morning, only grope for what will get it functioning. That is, when switched on, it will ask for something to do by showing a prompt or cursor on the screen.

For the computer to be of any use to you, you have to load a program: a list of instructions which tells the machine how to cope with the information you want to enter and manipulate. Programs may be stored and sold in disk or cassette form; or you can type them in yourself, line by line, from lists found in magazines or books. When you become more familiar with computing you might decide to try writing your own programs, but as a beginner you'll probably be most interested in prepackaged or even pre-entered software.

## Built-In Software

An increasing number of newly launched computers have software already installed in their read only memory (ROM). NEC's 8201 'lap' computer, for example, "wakes up" (as the brochure puts it) with three programs ready to use. A text editor allows the user to type in and edit text; a communications program, with the help of a plug-in interface (a connecting device), allows the user to communicate with other computers; and BASIC programming language is installed to translate the other two programs (and any more programs written in BASIC that you might load) to and from the binary code which the computer understands.

So, when roused, the 8201 will display a program menu and a list of files (if the user has already done some work). Most microcomputers, however, can still only raise a prompt when they open their eyes in response to the surge of being switched on.

(Just briefly: even the above-mentioned prompt, together with the computer's ability to get the disk drive whirring, and the capacity to accept the user's first instruction from the keyboard; even these small things which we take for granted are controlled by relatively small sections of program built into the computer's ROM. So the computer itself, without any of these built-in morsels of enlivening software, is merely a conglomerate of basic materials, a lump of metal and plastic with a glazed expression.)

## User Power

Clearly you, the computer user, are the one in control. You have access to software. As you may have found, there is a huge range available. Here I'll cover two of the major categories – word processing, and spreadsheets and home accounting – giving an idea of the ▷

variation in each and a very brief assessment of how easy or difficult I found it to use different packages at a basic level.

I think it's worth mentioning that until writing this article my experience with software was limited to a rudimentary knowledge of Wordstar – which must still be the most popular word processing package on the market.

### Text Manipulators In General

So, what does a word processor do? Most endearingly, it allows you to make endless corrections to text without finishing up with dried speckles of Liquid Paper on your face, stuck to your clothes and clogging your typewriter mechanism. Even if you've got a correctible IBM whizz-bang typing machine, you would still appreciate the ability to move blocks of text around the page or from document to document; store often-used documents for easy access; format letters, reports and so on for easy printing; and instantly find and replace words or phrases that have been consistently misspelt or misused throughout your text.

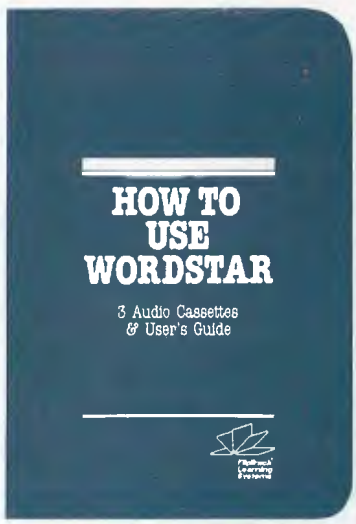
To break those capabilities down still further, correcting your work means easy deletion of unwanted characters, words, sentences, paragraphs and pages, or insertion of additional copy – all accompanied by automatic rearrangement of the following text. For example, you could delete a sentence and the rest of the paragraph would close in behind it, or 'reform', automatically.

When formatting a document for printing, you can adjust margins, indentation, line spacing, tabulations and so on. And most word processors will allow you to see how your copy will look before the printer starts cranking out the finished product.

Most word processors will perform these functions; some offer a little more or a little less. The packages differ mainly in how the tasks are performed and in how easy the package as a whole is to use.

### Learning Wordstar

As assistant editor on *Your Computer* magazine, I was required on my




first day in the office to learn how to sub-edit stories entered in a computer. Wordstar is resident on our system and was to be my major tool. I learnt to use the word processor in about two weeks, depending entirely on its screen menus and on questions asked of surrounding experts. (The terror that entrusting other people's work to a machine inspired wasn't overcome for at least a month.)

Someone did, at one stage, suggest I read the manual: an idea which was quickly quashed by others who had found it to be a virtually indecipherable bundle of paper. It was also proposed that I listen to the Wordstar learning tapes, but a mish-mash of deadlines and other things to do got in the way. Hence, I have only ever been able to use the Wordstar functions described in the 'help' menus – and most users will find that that's all they require.

For this article I glanced at the Wordstar manual and listened to the first of three tutorial cassettes (the set retails for $65, in addition to the $600 it costs for Wordstar itself). The manual is definitely not recommended reading (although I believe a revised version is now available), but the tapes would be invaluable to a novice without the benefit of an office full of computer buffs.

Wordstar can be supplied to run on most computers and is distributed by Imagineering.

### Controlling With Wordstar

Wordstar uses around 100 different commands to manipulate text. For example, simultaneous depression of the control key and the 'g' key will delete the character the cursor is on. Control 'y' will delete a whole line. Control 'f' will make the cursor skip from the beginning of one word to another, moving to the right. Other 'control' combinations will get you into other menus, scroll the screen up or down, move the cursor to the beginning or the end of the line, save your copy onto a diskette, set your margins, abandon altogether, or whatever.

As I said, you don't have to learn all these commands: menus explaining them can be called onto the screen at any time. While you're likely to leave the help menu at the top of your screen for the first week or so of using Wordstar, you tend soon to learn those commands which you use constantly and thereafter you'll only call on the menu when you have a slip of the memory or need an unfamiliar command.

Most word processing programs allow you to use arrow keys or programmable function keys, instead of control combinations, for moving the cursor one character to the left or right and one line up or down. (A programmable function key is a key that doesn't do anything until you program it to perform a particular task – usually a task that is often repeated and requires more than one key to execute normally.) If you have arrow keys on your keyboard, they may not automatically work with your chosen word processing package and some programming adjustments may be necessary. Make sure the software salesman explains these to you.

What apparently all word processors have is wraparound text. That is, as you type, every time you reach the end of a line the text automatically moves to the next line. So you only have to worry about carriage returns when you want to start a new paragraph. It's a bit disconcerting at first, but definitely improves your typing speed when you're used to it. (When I first used Wordstar, I'd look up from the keyboard to see

the whole screen scrolling up a line automatically and I'd gasp, "What've I done?" Now I just don't look until I've finished typing.)

Having ventured beyond 'My First Program', I realise the thing I most appreciated about that initial encounter with the medium is that I didn't have to load it into the computer. I didn't have to make a copy of the Wordstar diskette, I didn't have to 'configure' the program to our system. It was all there, palpitating warmly from within that lump of base materials on my desk.

### Spellbinding Capabilities

I tried to expose myself to trauma when I went to manipulate some text with Spellbinder, the 'Word Processor and Office Management System' distributed by Software Source (344 Oxford Street, Bondi Junction 2022); but again, it was all loaded for me and ready to go. Never mind, I can still tell you about the program's features.

Spellbinder has an edit mode and a command mode. In edit mode you enter and edit your words; in command mode you are expected to use words that tell the machine what to do with your edited copy. You have to go to the command mode (by pressing control and the 'q' key simultaneously, or by pressing the edit/command key if you have one) to save your copy onto a work disk, to print your copy, to exit from Spellbinder, and to retrieve your copy from the disk, among other things. You can also move the cursor, move text and delete text from within command mode.

Spellbinder uses a mixture of programmable function keys, 'control' key combinations, 'escape' key combinations and simple choices from menus (for example, from the command mode menu you might choose 'w' for 'write to disk') to perform your tasks. It all sounds terribly complex and the more I leaf through the manual while trying to explain it, the more paranoid I feel. Yet, when I used the program I followed that section of the manual entitled 'Basics' and felt there was nothing to it.

### Manual Advice

Starting at the start is obviously the way to go. Most software manuals will take you on an introductory tour of what the package will do, by way of examples. That is, with a word processing package the manual will take you through entering, editing, formatting and printing a sample document. With a spreadsheet package, the manual will create a sample spreadsheet. If the manual doesn't do something like this, look even more closely at the program before you buy, to see if you'll be able to get started without too much loss of hair.

Spellbinder does help you learn by example. Says Greg Lister of Software Source, "Spellbinder can stay a simple word processor, but you have powerful capabilities if you're prepared to learn."

### Macro Might

At the risk of scaring you away, I will mention that Spellbinder has, in addition to its ordinary word processing capabilities, a number of 'macros'. A Spellbinder macro is a program run from Spellbinder which performs a specific operation on regular files of text.

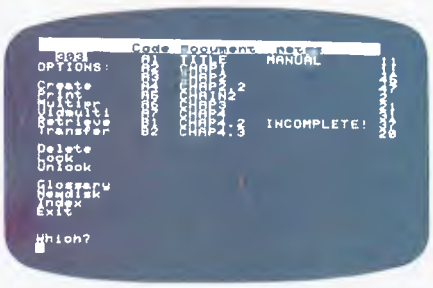
The Spellbinder package includes: macros that perform special printing functions, such as Batch which prints several files one after another; macros that sort, like Alpha which will arrange a list in alphabetic or numeric order; macros that prepare text, like MMerge which prints a personalised letter for each entry on an address list; and macros with mathematical capability, such as Calc which performs addition, subtraction, multiplication and division on numbers that are already in your text, or that you enter from the keyboard.

These macros, says our managing editor (after several cups of coffee), make Spellbinder probably the most powerful word processor around.

### Literate Aids

The new Spellbinder, which should be available by the time you read this, will also incorporate spelling and grammar checkers. You run such checkers after completing a document and they pick out any words which are not in their dictionary and any phrasing which their programmer has deemed unacceptable. You can either correct the words or phrases or ignore the program's advice. Most spelling checkers also allow you to update their dictionary – that is, enter words which you want the checker to accept, instead of parading them before you as mistakes.

Spellbinder runs on most CP/M-based machines and costs $795.



*The Zardax main menu (far left) shows a list of options and a list of the files you have on that disk. Pressing the 'Escape' key takes you to the inner menu, from which you decide what you want to do with the file you are working on.*

### Zardax

The most beginner-friendly word processor I came across was Zardax. This program runs on the Apple II+ and IIe computers (the II+ requires a keyboard modification to produce lower case characters) and costs $324.

The package comes with the sort of manual that says, "If you have never used a computer before, you should have confidence. Nothing that you can type on the keyboard will break the computer or the Zardax program." This marvellous ringbound booklet then goes on to give you a very brief description of many of the things we've told you here: it explains what computers are, what software is, it outlines the functions of various keys on your keyboard, it tells you how to treat disks and disk drives, it outlines how printers and printer buffers work – the designers of this program *like* you.

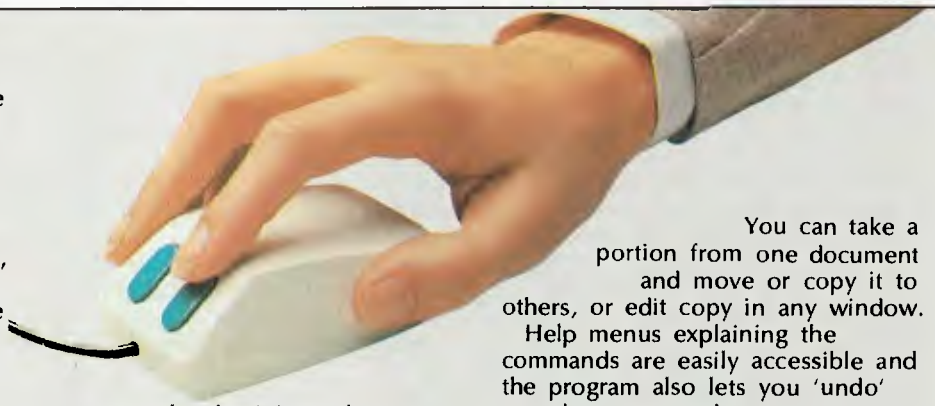
So, you begin to use Zardax in an understanding state of mind. I did, and this time I did it all: I borrowed an Apple IIe and using one disk drive I loaded the program, prepared a diskette to work on and I worked – without any help from my friends.

When you get Zardax running on your computer, it displays a main menu, together with a list of the documents currently on the master

### Of Mice And Microsoft Word

Another variation on the word processing theme is to use a mouse to edit text. Trying to use Microsoft Word ($499) with the optional 'mouse' ($185) was a confusing experience, mainly because of my previous conditioning to Wordstar. Microsoft Word runs on the IBM-PC, or machines which are interface compatible with the IBM-PC like the Compaq and the Columbia.

When first using the Microsoft package, it's disappointing to discover that you don't use the mouse for the majority of tasks. The mouse is a means of communicating your requirements to the computer that eliminates the need to learn the commands often used in keyboard communication. The mouse rolls around on the desk and an arrow on the screen corresponds to its movements. So, you move the mouse until the arrow is pointing to the word, paragraph or whatever you want to change; that particular text is then marked and you move the arrow to the menu at the bottom of the page, point to the command you want and press a button on the mouse to execute that command. It's just not practical, as you come to realise, to use the mouse for everything. You do still have to learn to use the keyboard.



You can take a portion from one document and move or copy it to others, or edit copy in any window.

Help menus explaining the commands are easily accessible and the program also lets you 'undo' your last command.

Fortunately, the Microsoft system of word processing is quite simple. It relies mainly on single-key commands rather than 'control' or other combinations.

Microsoft Word's screen incorporates plenty of unobtrusive information. At the top is a ruler which shows the position of margins, indentations and any tabs you might have set. The command menu resides at the bottom of the page, along with a prompt message which helps you decide what to do next, a 'free space' reading and an indicator to tell you which mode you are in.

Microsoft Word also allows you to divide your screen into up to eight windows. These can display other parts of the document you are working on, or other documents.

### The Highlights

Microsoft was the only program I encountered which lets you underline, italicise or bold-face parts of the text and show that highlight on the video page. Most word processors that allow such highlighting require you to enter print commands on either side of the word, sentence or paragraph, with the result that you don't see how it looks until the document is printed.

The only criticism I had of Microsoft Word, especially when I was using the mouse as an aid, was that I found the manual confusing. The salesmen at City Personal Computers in Sydney scoffed at me and held the old Wordstar manual up for comparison. I should have

disk. From this menu, the user can execute commands such as create, print, transfer and delete. By hitting the 'Escape' key the inner menu is revealed, which contains commands such as change, draft, main menu, print, videoprint and others. Executing a command from the menu is incredibly simple: you press 'c' for change, for example. Work files are allocated codes by the program when they are created, so calling them up is made simpler, too.

Zardax also has wraparound text, but rather than wrapping around at the end of the last word that will fit on the line, it fills the line right to the margin and continues the word on the next line. This can be awkward to proofread. However, the videoprint command is designed to show you how the copy will look when printed. So, after writing your copy you can execute the videoprint command and then start playing around with margins and tab settings and centring, all the time switching back to videoprint to see what effect your commands are having on the appearance of your document.

Zardax won a special commendation for software in *Your Computer* magazine's Computer of the Year Awards. One of the judges described it as "a rare thing: a word processor that is neither too difficult to use, nor too simplistic to be useful".

Some of Zardax's more sophisticated capabilities include moving blocks of text around a document; assembling a document from a collection of standard paragraphs or phrases (commonly known as 'boilerplating'); the ability to search for and replace incorrectly spelled or other words, automatically; and so on.

had a copy of the Zardax manual to wave as a challenge.

Of course, there are many more word processing packages available, and finding the one that suits you, your computer and your printer is up to you. If the software salesman can't or won't let you sit down at a terminal and use the package by yourself, go to a shop where you can. In general, if you can find your way through one of the introductory exercises in the manual and feel fairly confident about it, you won't have any problems. Make sure you also find out exactly what your computer, or the computer you're thinking of buying, will need to run the program; for example, will you need any special cards (see 'Optional Extras' article) or extra memory?

## Now For Numbers

Now, to leap into the complete unknown and tackle some financially oriented software packages.

I dabbled with three such programs: Supercalc, Microsoft Multiplan and the more domestic Home Accountant. I was pleasantly surprised by the two spreadsheets, which I thought would be the most difficult to understand; Multiplan and Supercalc were both so well explained in the manuals, I only regretted I didn't have time to experiment further with them.

A spreadsheet program provides the user with an electronic worksheet in the form of a large grid of rows and columns. Each 'cell' on the sheet is designated by its row and column number and may hold text, numbers or formulas.

It is the ability to easily calculate the 'what ifs' in business situations that is touted as the spreadsheet's most useful capability. For example, given all the information pertaining to the profits made on a range of products, a spreadsheet can quickly recalculate final figures if you change any factor. You might want to see the effect of increasing production; of using cheaper raw materials; of paying for express freight to get the product to market more quickly; of increasing the advertising budget; of raising the price of a product by ten per cent; or whatever. Because a spreadsheet keeps track of the relationship between different figures on the sheet, it can give revised results instantly.

When asked what one should look for in a spreadsheet, managing editor Matt Whelan said, "A spreadsheet program either has to be able to hold large spreadsheets in memory, or it has to be able to have different spreadsheets in different files that you can look up and compare. For example, Multiplan has complex capabilities, but it doesn't leave much room for your actual information – but it can spread your worksheet over several different files and relate them."

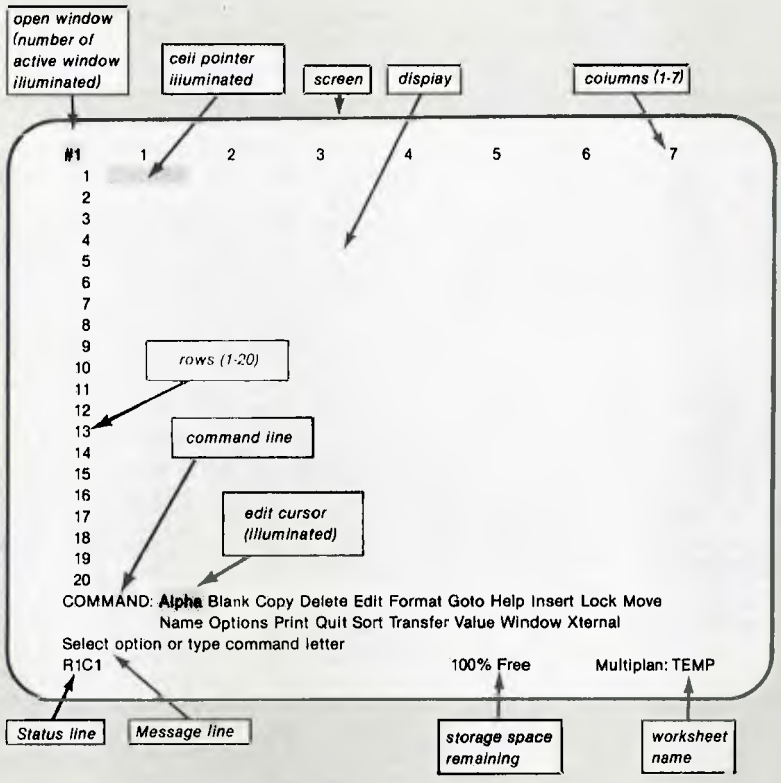
### Multiplan

Multiplan has a spreadsheet size of 255 rows by 63 columns, although at any one time you can only see a section of the sheet measuring around 20 rows by seven columns (depending on your monitor). Moving to parts of the worksheet that are off-screen is simply achieved: either by scrolling with the arrow keys so the screen follows the cursor (if you don't have arrow keys or programmable function keys, you'll use control key combinations); or by using the 'Goto' command, selecting the 'Row/column' option from the sub menu and typing in the desired co-ordinates of the cell you want to enter (for example, R7 C60).

The Multiplan screen shows the co-ordinates of the section of the worksheet you are working on across the top and down the left side of the page. Like Microsoft Word it also displays a list of commands across the bottom of the screen. It has a message line which suggests what to do next (for example, "Select option or type command letter"), and it has a status line which gives the co-ordinates of what is called the 'active' cell – the cell where the worksheet cursor is positioned. Also on the screen is a 'free space' reading and the name of your worksheet.

Aside from the worksheet cursor, ▷

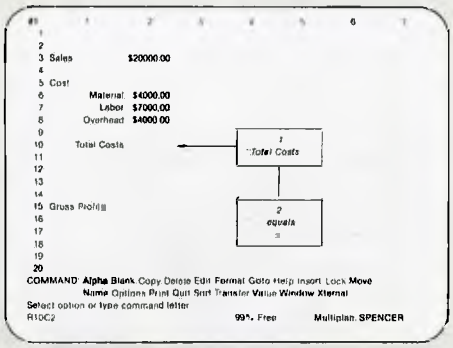
When Multiplan is loaded and ready, your screen will show the following display:




*These diagrams are typical of how Multiplan is explained in its manual. Above is an explanation of the Multiplan screen. To the right are step-by-step instructions on how to write a formula which will always give the sum of the column under which it was written.*

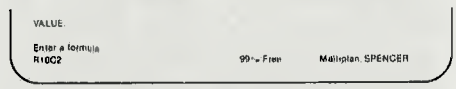
"Total Costs.

1. Place the cell pointer next to *Total Costs*



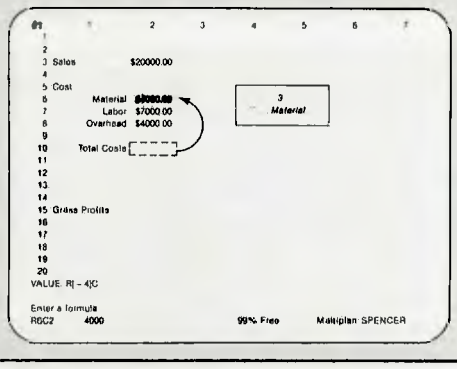

"equals"

2. Press . (To begin a formula in Multiplan, press either or *V* for the Value command.) Look at the command line.




"row 6 (*Material*)

3. Move the cell pointer up 4 rows to row 6. (Watch the formula being built on the command line. The entry R[-4]C is a formula to tell Multiplan to go up 4 rows in this column to find a value).




there is also a command line cursor, which is moved through the command menu using the space bar. You can also select commands by typing their first letter, like 'd' for delete or 'e' for edit.

## How To

At the risk of getting technical I'll explain how you enter information on the worksheet. To enter data in a cell:

1. Position the worksheet cursor on that cell (using Goto or the arrow keys).

2. Type 'a' for Alpha (if you want to enter words) or 'v' for Value (if you want to enter numbers) and press return.

3. If you press A, the command line is replaced by 'Alpha:', followed by the cursor, and the message line prompts you to 'Enter text'. You type the text and it appears after the Alpha on the command line. Here you can edit it with backspace and delete keys before pressing return to transfer it to the cursor position on the worksheet.

Implementing formulas to control the relationship between cells is, dare I say it, fun – though I imagine the novelty of it would wear off after a while. For example, for the program to calculate the total of a column of figures and display that total at the bottom of the column you:

1. Begin with the worksheet cursor in the cell directly below the column where you want the total to appear.

2. Type an equals (=) sign, which tells Multiplan to begin a formula.

3. Move the worksheet cursor to the number at the top of the column and type plus (+).

4. Move the worksheet cursor to the next number in the column and and continue this process until you've added every cell in the column.

5. Hit return.

The total will appear at the bottom of the column, where you originally placed your cursor. If you change any cell content in that column, the total will automatically adjust. You can also edit the formula if you want to, since it appears in the status line every time the cursor is on the cell displaying the total figure.

In a similar fashion the user can also perform multiplication, division or subtraction between one row or column and another, to produce a third row or column. You can write formulas to add ten per cent sales tax, to multiply by the number of units in a box, and so on.

Multiplan allows you to fix one

"plus . . .

4. Press +. Watch how the formula builds. Notice that the cell pointer moves back to its original position.

"row 7 (*Labor*) . . .

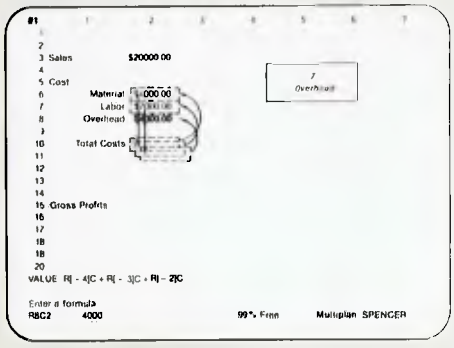
5. Move the cell pointer to row 7.

"plus . . .

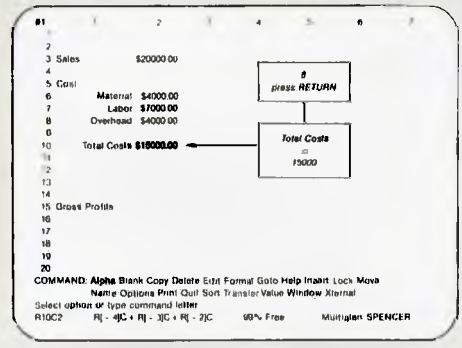
6. Press +.

"row 8 (*Overhead*)."

7. Move the cell pointer next to *Overhead*.




8. Press RETURN. You will see $15000.00 now appear next to *Total Costs*. Look at the status line to see the formula Multiplan used to calculate the total.




part of the worksheet on the screen while you look at another. For example, your columns may extend well beyond the visible page, but you would like to be able to see the column titles while looking at the figures at the bottom of the column. This is easily done by fixing the titles at the top of the screen and scrolling the other half of the screen downwards.

Multiplan has too many features to mention in detail here, but all are extremely well explained in the manual, and an efficient range of easily accessed help menus is also available to aid you in your work. The program costs $395, and runs on MS-DOS and CP/M-80 machines.

### Supercalc

Supercalc is a spreadsheet calculator for the IBM-PC (for which it costs $445) or for computers running on CP/M operating systems ($395). I've been told it is very similar to Visicalc, another spreadsheet program for machines such as the Apple II and III, Tandy's TRS-80, the Commodore CBM, Atari 800 and the Hewlett Packard HP-85 and HP-125.

Supercalc gives a spreadsheet of 64 rows and 254 columns. The screen differs little from that of Multiplan. It uses letters to define columns, instead of numbers, and the list of commands is not always visible but must be summoned by typing a slash (/).

To move the cursor around the screen without the arrow keys, you press equals (=), type the cell co-ordinates (for example, M37) and hit return. If you do use the arrow keys to move the cursor, every carriage return made after pressing the arrow key will move the cursor one cell in that direction. For example, if you are entering all the figures for one row, you only have to use the 'right' arrow key once after the first entry; thereafter, hitting the return key will automatically move the cursor one cell to the right – until you hit a different arrow key.

Writing data to a cell is done in almost the same way as in Multiplan. In other words, each entry appears at the bottom of the screen first, where you can edit, before being moved to the worksheet cursor position by hitting return. In Supercalc, if you are entering text it must be preceded by double inverted commas (").

If you are entering numbers and a figure is too long for the nine-character default width of the columns, Supercalc will automatically display it in exponential notation. For example 2,500,000,000 would be displayed as 2.5e9.

With Supercalc you can specify that all numbers be displayed in exponential notation; or that they be rounded off to the nearest whole number; or that they be displayed as dollars (with the '$' sign and two decimal points).

Both Supercalc and Multiplan allow the contents of cells to be automatically displayed flush with the right margin of the column, flush with the left, or centred. Both programs also allow column width to be changed.

Another Supercalc feature is that you can 'protect' cells or blocks of cells against their contents being accidentally deleted. To do this, you summon the command menu by typing a slash (/); choose 'p' for Protect; specify the range of cells you want to protect, say A8:J8; and press return. All cells in row 8, between and including columns A and J, can no longer be changed, moved or deleted until you 'unprotect' them. (Multiplan also has a

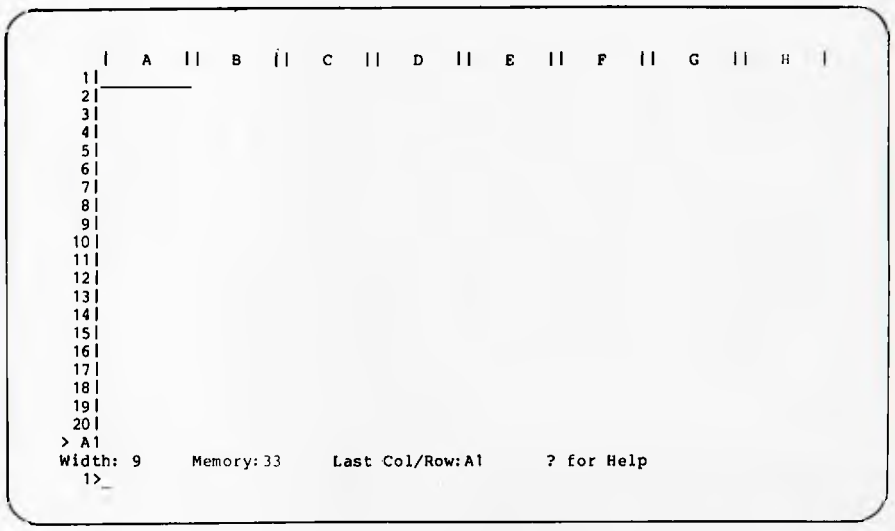
similar option.)

Like Multiplan, Supercalc lets you lock your title row in place while you scroll to the bottom of your columns.

Supercalc also has limited graphics capabilities and a series of help menus which can be activated at any time by typing a question mark (?).

The Supercalc manual doesn't have as many diagrams as that of Multiplan, but it is still very easy to understand.

More extensive reviews of these and other financial planning programs may be found in back issues of *Your Computer*. I can only reiterate that as a person whose work and interests revolve mainly around words, I found the numbers game of spreadsheet programs easy to grasp and even interesting.




*The Supercalc spreadsheet page. Here A1 is the active cell (the cell on which the worksheet cursor is positioned). Typing a slash (/) summons the command menu.*

## At Home Accounting

Why then did I find The Home Accountant – a package for Apple II, II+ and IIe and other computers – so intimidating? I must admit to a mental block when it comes to accounting; the thought of making serious movements towards tracking my personal expenditure is horrifying, and as for calling a cheque book an 'asset' ...

These personal prejudices put my understanding of accounting firmly in the debit column. If you have even minor credit in this area, I'm sure you'll get great satisfaction from keeping your affairs tidy with The Home Accountant.

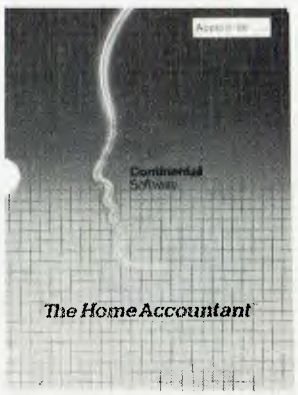
The program can: define up to 100 budget categories; monitor transactions for cash, cheque books, credit cards, income, expenses, other assets and liabilities; search and display single or multiple transactions by date, cheque number, payee, amount, budget category, memo, or any combination of these items; extend transaction records over multiple diskettes; keep track of up to five cheque books; maintain a separate cash account for each cheque book; handle automatic monthly transactions (up to five per cheque book); have an individual transaction split over several budget categories; reconcile bank statements; print cheques; and print the year's budget, balance sheet and net worth statement.

## Purposeful Package

The purpose of The Home Accountant is first to allow you to see how much money is being earned (including invisible earnings such as home equity), and to track where this money is being spent. Second, it gives you the opportunity to project how much money will be spent or earned, and then see how close your predictions were to the actual amounts (whoops!).

The menus function as shown on page 65. You select an option by typing its number. After entering the main work module, option 5 (Budget) in the first menu, you use option 6 (New System) to prepare a work disk and option 5 (System Information) to begin entering data.

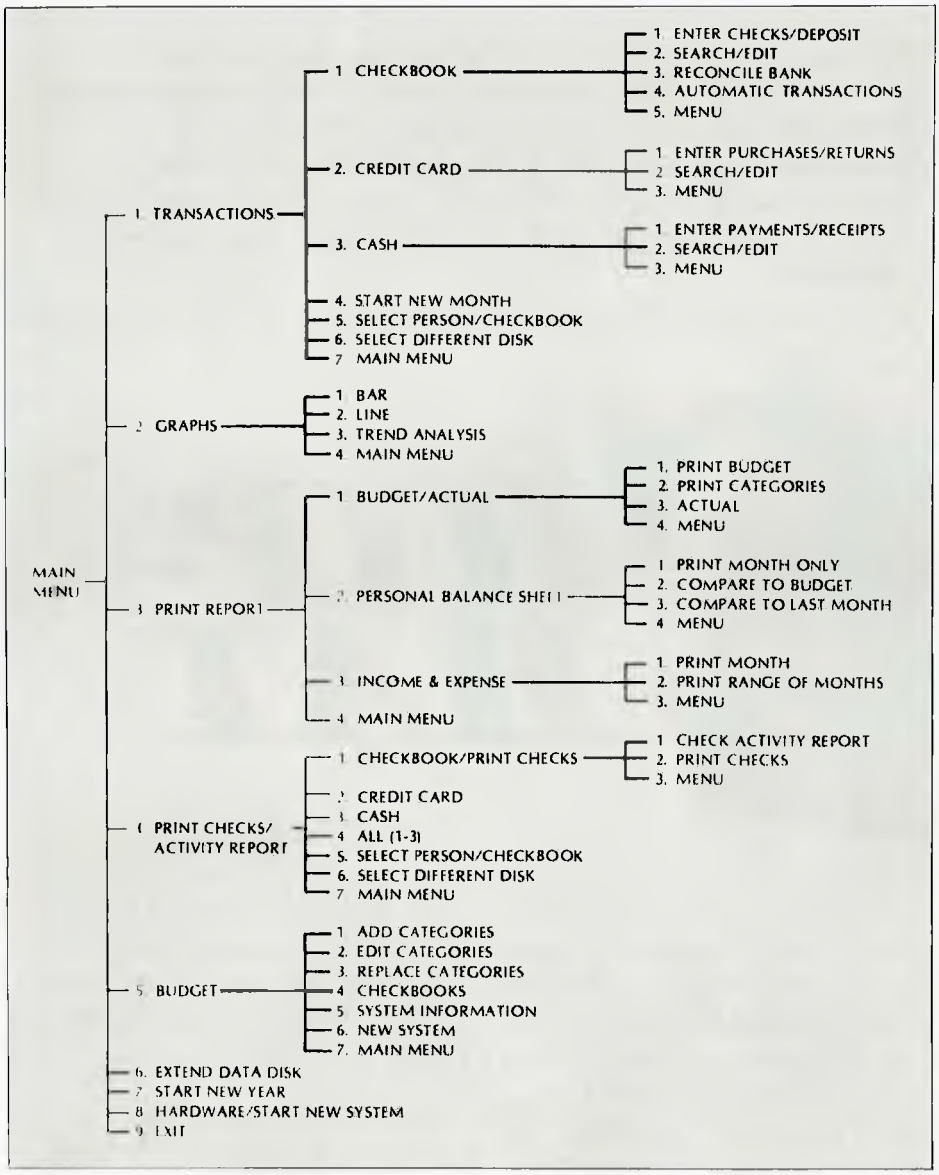
The Home Accountant employs an unusual method for entering information. Text or numbers are entered in fields, each of which is designated by a letter of the alphabet. (A field might constitute a space for your name or address, for your cheque book expenditure for the month of June, for the day of the month on which a certain payment must be made – you are prompted to enter all of these.) You type in the information you

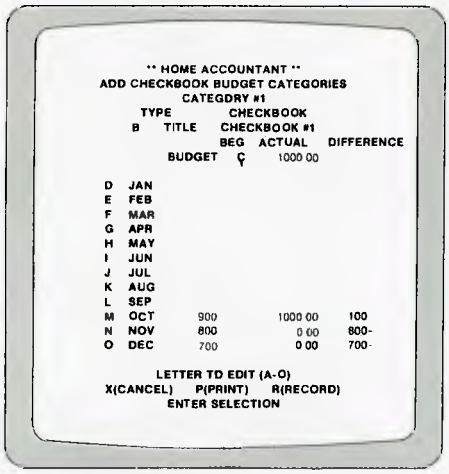



want in one field, press return and you are in the next field. You can't edit during this process, which continues till you get to the end of the page. There, you find a little menu asking you which field you want to edit, whether you want to cancel the whole screen, print the screen or record the information you've entered. It's quite a cunning little system, since not being able to correct while you type makes you check the whole screen before pressing 'r' for record.

The manual is very easy to follow. I entered my entire budget without having any computing hassles, and without understanding what I was doing in accounting terms. (The manual explains these terms, I just *wouldn't* understand!)

To run The Home Accountant on




*The tree diagram at left shows the system of menu choices for the Home Accountant package. Above is the screen given for entering expenditure for one cheque book – the program can keep track of five.*

an Apple, as I did, you'll need – aside from your Apple with at least 48K of RAM – Applesoft in ROM, at least one disk drive (two are recommended), a video display screen, and an 80-column or 132-column printer with a standard Apple parallel or serial interface card. The program costs around $100 for Atari machines and the Commodore 64, $105 for Apple machines, and $198 for the IBM-PC.

Talking of the Commodore 64, there is a program available for that machine which is similar to The Home Accountant in aim but less comprehensive in range – more for very simple budgets! It's called Cashflow Manager, and although I didn't have time to work with it myself, I've heard favourable reports of it from several users. Contact your Commodore dealer for more details. ❑

...PURPOSE OF THE HOME ACCOUNTANT IS FIRST TO ALLOW YOU TO SEE HOW MUCH MONEY IS BEING EARNED...

*Personal Computers are a useful tool for long distance communication. They provide an easy interface to the equipment needed to send data over long distances; they can be programmed to take some of the problems out of such communication; and, by their very nature, they provide a rich source of data that is worthwhile exchanging with other enthusiasts!*

# CHIP-CHAT

By Jeff Richards

At the business level there are many advantages in using a computer for data communication. A personal computer with a word processor can be connected to the phone line, to provide a replacement for a telex machine. Messages can be edited and checked, and sent at full speed to minimise connect time. A computer can be programmed to receive and store messages when it is unattended. Since the messages can be stored to disk, they can be incorporated directly into documents being prepared with a word processor. And, for both the business and private user, the small computer can provide direct access to vast databases at a very moderate cost.

In order to understand how a computer can send and receive data over a phone line it is necessary to understand what is meant by the term 'serial data transmission'.

## Serial Data Transmission

The normal format for data in a small computer is a 'word' consisting of eight bits, each of which can be a logic 0 or a logic 1. This 8-bit word can take on 256 different values; more than enough to handle all the alphabet, the numbers 0 to 9 and special characters. This word is usually handled as a single unit; for instance, when you press a key on the keyboard, somewhere inside the machine eight electronic switches (transistors) switch on or off to represent the key that was struck. The CPU can then look at these switches, read the information out of them, and decide what to do with it.

When it comes to data that must be sent down phone lines, obviously this format wouldn't work – we

would need eight separate lines if a device at the other end wanted to 'read' the eight bits of our data word at the one time. The answer is to convert the word from its parallel form into a serial form. In this mode the eight bits of data are sent one after the other. The sending device examines the data word one bit at a time and puts a signal on the wire indicating whether the bit is on or off. The receiving device examines the wire at the same time, and builds the data word by determining whether the signal is present or absent.

It is a bit like trying to get a captured Russian tank across a ricketty bridge in Afghanistan. The bridge won't support the whole tank, but if it can be dismantled then each piece can be taken across separately and the whole thing re-assembled on the other side. We have to know how it was taken apart, of course, so that it can be re-assembled properly. Sometimes sorting out serial transmission data into sensible words seems as difficult as assembling a tank when all the instructions are in Russian!

## Two Signal States

In order to appreciate the problem with serial transmission it is important to understand that the signal we are attempting to decipher has only two states – 0 and 1. Using just these two states or signal levels we have to be sure that the receiving device knows when the word starts and ends; and where, within the word, each data bit occurs.

The problem of defining the start and end of each word is accomplished by using start and stop bits. If the signal line is normally in a quiescent state, then a sudden change to the active state will signal the start of a word. If the receiver and transmitter can agree on the number of data bits per word and the rate at which they will be presented to the signal line, then the receiver tests the line at the agreed time interval and records the signal level. The bits of the word are gradually built up until the whole word is complete. During this process the timing of the receiver and transmitter may not have been entirely in agreement, but as long as the word is fairly short the sampling of the line by the receiver does not have a chance to get too far out of synch and the data bits are still decoded correctly.

Finally, the transmitter signals the end of the word by holding the line in the quiescent state for a specified period. This means that if the receiver timing is running a bit slow, it has time to catch up before the next word is started; and when the next word does start, the receiver will be ready so timing errors do not accumulate.

## Three-Pronged Agreement

Thus the receiver and transmitter have to agree on three things: how long the start signal is, how fast the data bits will come, and how long the stop signal (actually, the stop gap) is. The start and stop signal times are expressed in terms of the data bit rate. In other words, if we specify 300 data bits per second, one start bit, seven data bits and two stop bits, then the receiver knows it can expect a start signal of 1/300th of a second, seven data bits each of 1/300th of a second and a stop signal of 2/300ths of a second. This data bit rate is called the baud rate. You can work out with this scheme that if everything is going flat-out, the system will communicate at 30 words per second. (Eight-bit data words, that is. 'Word' is used here in the sense that 'byte' is often used.)

By convention, the start signal is always one bit long. The number of data bits varies from five to eight, and there can be one or two stop bits. The baud rate can take on almost any value, but typical rates are 110, 300, 1200 and 9600. The most common standard for small systems data communication is 300 baud, eight data bits and one stop bit.

For systems that use eight data bits, the eighth bit is not necessarily used in the transmission. As seven bits are sufficient to encode 127 characters, the eighth bit can be used to check the accuracy of the received data. A rule can be established that the number of logic ones in a word must be (say) even, and the eighth bit set to one or zero so that this rule is maintained. The receiving device then counts the numbers of ones in the received word and signals an error if this is not even. When used in this way, the eighth bit is referred to as the parity bit. Parity can be odd or even, or it can be ignored. Most data communication systems ignore parity.

## Communication Requirements

In order to communicate with other computers over a serial line, you will need a means of setting your computer to the data format (baud rate, number of data bits, number of stop bits and parity) that is compatible with the other machine. This may require switches or jumpers inside the computer, or it may be achieved with a small utility program.

A signal transmitted in serial form can be easily converted into a variety of forms suitable for different transmission media. If the signal is to be transmitted by wire, voltage levels can be used. Because the standard TTL voltage levels within the computer do not travel long distances very well, they are usually converted into some other form. The popular RS232 standard specifies that a voltage level on the line of –3 to –12 volts will be regarded as a logic 1 and a level of +3 to +12 volts will be regarded as logic 0. An older standard uses the presence or absence of a 20 ma current.

## Phone Transmission

If the data is to be transmitted by phone, then voltage levels are not suitable. For a start, Telecom would not like people putting plus and minus 12 volts down their telephone line. Also, the voltages would get lost within the switchboards of exchanges. Besides, we don't know if part of the phone network isn't a microwave radio link or even fibre-optic cable! For telephone operation it is necessary to convert the signals into pulses of high and low frequency tones to represent the ones and zeroes. The device that will do this is called a modem.

Converting the signal to tones has another advantage. If the two devices that wish to communicate over the phone lines select different pairs of tones for their signals, one phone line can support communication in two directions at once. That is, one modem can be set to read the pair of tones produced by the other modem, while it transmits using a different pair of tones – thus its own transmission does not interfere with the signal it is trying to read from the other end.

Although modems are usually designed for phone transmission, and often plug directly into the phone network, they can be used for a transmission medium that uses audio tones. Modems are used extensively for data transmission by radio and have largely taken over from morse code.

Direct connect modems operate by connecting directly to the phone network and reading and transmitting ▷

the tones electronically. Acoustic couplers are modems that transmit the tones through a speaker placed next to the mouthpiece of the handset, and receive the tones through a microphone placed next to the handset earpiece.

### The Computer/Modem Connection

The connection between the computer and the modem is usually at RS232 signal levels. Indeed, the RS232 standard was originally developed to specify the connection between a terminal and a modem in the private time-sharing database networks. The standard has since been used for all sorts of purposes that have nothing to do with modems and terminals.

The RS232 standard specifies the voltage levels that will operate in this computer-modem connection and how they should be wired together. At least three connections will be needed. Data from the computer will probably appear on pin 2 of the computer's connector and should be labelled TxD (Transmit Data). This wire should go to pin 2 of the modem, which will also be labelled TxD. Similarly, pin 3 of the computer (RxD) should go to pin 3 of the modem. Pin 7 from the computer is an earth and should be connected to pin 7 in the modem. (Pin 1 is probably also an earth on both devices.)

# CHIP-HAT

### Confusion

At this stage you have already seen the confusion that is inherent in RS232 communications. At the modem, pin 2 is labelled TxD, but it actually represents the signal received by the modem. To try and avoid the confusion, remember the whole standard is concerned with attaching terminals to modems – the pins are all named from the terminal's viewpoint.

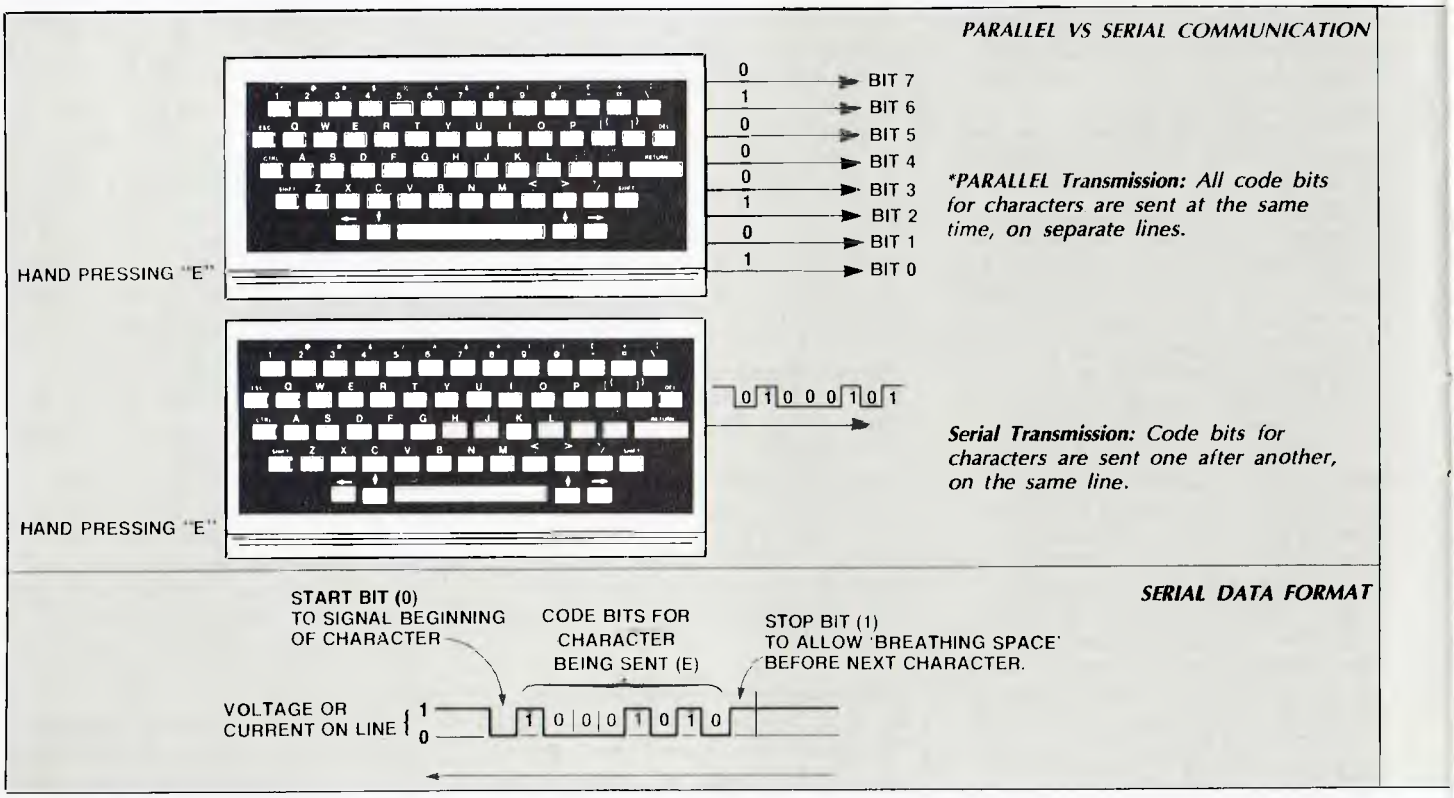
Additional confusion arises because the serial port on the computer is often asked to serve a dual purpose. If it is used to drive a serial printer, for instance, then it may be set up to regard the printer as the 'terminal', in which case its pins may be arranged so they appear to be a modem to the attached printer. In this case TxD on the computer means the same as TxD does on the modem – the pin on which data is received into the device!

When trying to attach different RS232 devices, the only reliable way to proceed is to identify each pin as input or output. A cheap multimeter, preferably digital, will show a steady voltage of at least +/- 3 volts if the pin is an output. An input pin will show a few hundred millivolts, and will tend to alter significantly if you touch it with a finger. Unscientific, but it works.

### The Other Pins

What about all those other pins in the RS232 standard? Most of them can be ignored, but there may be some which are important. These are likely to be at the computer end. The RS232 standard provides a number of signals that are used to control the action of the sending device, to try and ensure that it does not send when the receiver is not ready to receive. This is usually labelled CTS (Clear To Send – 5) or perhaps DSR (Data Set Ready – 6). If the serial port were being used to drive a printer, for instance, then the printer could use these signals to tell the computer when it was busy printing and unable to accept more characters, thus preventing characters from getting lost.

In the usual modem communication arrangement, the same signal may be produced by the modem to stop the computer sending if the receiver appears not to be ready; for instance, if the modem can't hear the signal from the other end of the line. It is more usual, however,



not to bother with such niceties, and assume that the receiver is always ready. But, the computer will frequently be programmed to stop sending unless it gets the correct CTS or DSR signal. In this case the computer will have to be fooled into imagining that the receiving device is always ready. This is done by tying the computer's own 'ready to receive' signal back into CTS or DSR. Such a signal is usually available at a pin called DTR (Data Terminal Ready – 20) or RTS (Request to Send – 4).

### Just One More

Before you are ready to get under way, one more compatibility point must be established. To enable both the sender and the receiver to operate on the one phone line, they are assigned different pairs of tones. In order to communicate correctly, the modems must be set to opposite modes. This way each will understand the tones used by the modem at the other end, while transmitting in tones that the modem at the other end can comprehend. The two modes are called answer/originate or possibly instation/outstation. If you are just talking to a friend you will have to decide who will be which. If you want to talk to a database service or RCPM, you will almost certainly have to be originate (or outstation).

Having got the whole thing wired up, how do you drive it? Many small computers are supplied with a program that permits them to appear like a terminal to a time-share service. This program, sometimes called a terminal emulator, can be extremely simple. All it has to do is send any key entered at the keyboard to the serial port, and send any character received at the serial port to the screen. This program is enough to get you started talking to other enthusiasts or bulletin boards.

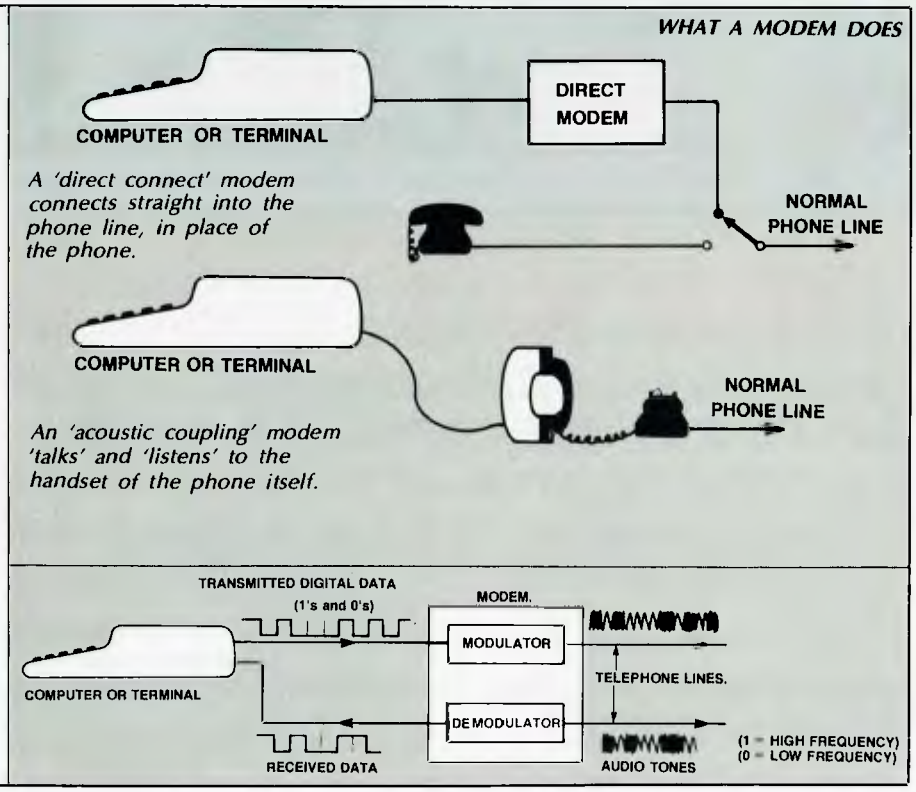
The next step is to add some means of saving the terminal session so you can retrieve it for later analysis. In addition, it might be useful to be able to send a text file that had been previously created and stored away. While you are sending and receiving text files, the program need not be complex – errors in the communication are not serious. If you want to send programs, however, it is necessary that you have some technique for ensuring that transmission and reception are 100 per cent accurate. This is where a program that supports one of the 'communication protocols' becomes important.

### Chunky

When such a program is sending or receiving data, it will deal with it in small chunks. Each chunk will be checked for accuracy using a device called a checksum. The next chunk will not be sent until the receiver indicates that the previous one has been successfully received, and, if necessary, the receiver will request that a chunk be retransmitted. Obviously, the sender and the receiver have to run to the same set of rules if this procedure is going to work. The most common procedure for small computers is the Christensen protocol, and MODEM7 and YAM are two CP/M programs that support this protocol.

Another common protocol is BLAST, which is widely available for small computers. It is particularly suitable for business communications, as the programs that use it are very 'user- friendly'. The Christensen protocol is used by all the Remote CP/M systems and most of the bulletin boards. MODEM7 and YAM can function like a terminal emulator, but BLAST will only talk to another BLAST.

So now you are ready to start communicating. Try one of the bulletin board services in terminal mode, to confirm that you can establish reliable communication. The first file to read (and store, if possible) will be the instructions on using the system. Study the instructions, then come back with an empty disk ready to collect some of the software and data that is available. Don't be afraid to leave a message asking for assistance, if you still require it. And if you don't need further assistance, why not offer to help someone who is just starting out! ❑



# COMPUTING

*Monday afternoon: 36,000 feet with Cathay Pacific.* The view from up here is spectacular. Just a few wisps of cloud, a washed-out, clear-blue sky; and below, the brown expanse of central Australia.

In a couple of minutes, the hosties will arrive with the tucker trolley and a nice bottle of red. So I shall have no alternative but to interrupt this story for a bite to eat. Hope you'll understand.

In the meantime, let me fill you in. As I write this, we're floating along en route to Tokyo via Hong Kong. This time tomorrow I'll be in Osaka, beginning a series of meetings which will produce two magazine articles, some newspaper copy and, hopefully, some background material for a book chapter. It's been a real bust 'n' tear effort to clean up a swag of work before making the frantic last-minute dash to the airport. It usually happens like that. But on this trip, one important assignment has been left outstanding. Normally, that would create a great deal of heartburn ...

The story is the one you're reading – a tale of computing on the run. And really, the situation I'm in right now couldn't provide a more perfect example of the benefits of the so-called 'lap computer'. Allow me to digress.

Writing on an aircraft is not a new experience for any journalist (or businessman for that matter) on an overseas or interstate assignment. But it's a chore we could all live without. In the old days (three

*They're new, so small you can easily fit them inside a briefcase, yet more powerful than many desktop models. In the jargon of the industry, they're called 'lap computers'. They've already revolutionised the newspaper business. Could they do the same for you?*

# ON THE RUN

By Phil Scott

years ago) you had two choices: write your piece in longhand, or use a portable typewriter.

The latter method invariably raised the ire of passengers in the near vicinity. Within a few metallic, clackety-clack keystrokes your neighbours would get restless. After ten minutes, if looks could kill you'd be stone dead. After twenty, terse words were exchanged and no amount of explanation about the tyranny of deadlines counted a hoot.

As for writing longhand copy, it's simply impossible for anyone who's been trained to think on a keyboard.

Then the Brother office machine company came along with a battery powered portable called the EP20. It was light, wafer thin, quiet, and worked well on planes, in hotel rooms and for quick copy or notes on the run. But it was only a glorified typewriter. The print quality wasn't great, battery life was limited and the cassette ribbons had a habit of running out halfway through a piece. Nonetheless, it was a $249 giant leap forward.

**Sitting On My Lap**

Then, mid-way through 1983, the revolution started. Tandy introduced the Model 100 'lap computer'. It measured just 302 by 216 by 51 mm ( 12" by 8.5" by 2" thick, in the old money) and weighed 1.8 kilograms (or 4lbs). Within weeks NEC had its 8201A on the market, to be followed by Olivetti with the M10.

These three machines, all made by the Kyocera company of Japan, are basically the same – but with some important variations.

Each is equipped with in-built software, namely Microsoft BASIC programming language, a simple but effective word processor and a brilliant communications set-up which allows transfer from lap to micro, mini or mainframe computer, via modem or coupler, over the telephone.

Each is battery powered, with about 18 hours of keyboard work from four penlight Duracells. And the only noise the man next to me can hear is the muted rattle of the keys.

One of the great features of these machines is that they will store your input when the power's switched off. Instead of wiping out all that precious work, they'll happily store it for up to six months.

*The Olivetti M10 weighs only 1.5 kg, has an 8-line by 40-character liquid crystal display, graphics capabilities and 8K of RAM expandable to 32K.*

In standard form, the Tandy comes with eight kilobytes of RAM for $899; or with 24K, at $1099. It can be further expanded to 32K with plug-in 8K memory chips that sell for about $120 a throw.

The NEC 8201A is a 16K computer in standard trim, selling for $1095 (although many stores are selling them for $950 or lower). The one I'm using to write this story has had a high performance tune-up. Six additional 8K chips have been plugged into the back for a total of 64K, and an extra investment of $774. Also, there's is a further 32K capacity, in the form of a RAM pack which plugs in and out just like an audio cassette and costs a further $482. That feature is unique to the NEC and, for my money, puts it in a different class to the other two machines. So, my pint-sized machine has a quite stunning 96K capacity – for a total investment of $2351. Of course, most people probably wouldn't need any more than 32K, but on this trip I intend to write at least 15,000 words – a total about five times the length of this story. If I need to do anymore, I'll simply dump some of the contents from the little NEC's memory onto a normal microcassette recorder. Once it's on tape, I can call it back anytime.

*The Tandy 100 costs $899 with 8K of RAM and $1099 with 24K.*

*The NEC 8201A is a 16K computer selling for $1095, and is expandable to 96K capacity.*

The Olivetti M10, the third member of this trio, is available in 8, 16, 24 or 32K trim with prices spanning $969 to $1429. It doesn't have the same memory capacity as the NEC, but it does have a tilt-adjustable screen. This liquid crystal display has the same capacity as the others (eight lines by 40 characters), but can be angled for better comfort. Hang about, the tucker trolley's finally arrived, so I'll sign off for the time being. What I'll do is press a button, everything I've written so far will be saved, then I'll switch off the power, and return the NEC to my briefcase. Bye for now.

## Rise And Type

*Tuesday morning, very early: Hotel Furama, Kowloon.* Back on deck again, this time in a hotel room with a view of Hong Kong Harbour. I've just recalled this story out of the memory with two keystrokes and we're ready to go again.

As we said earlier, all three machines come with in-built software. Right now I'm using the word processing set-up which is adequate, but a little restrictive when compared to the full-blown programs like Wordstar. When this story is finished, I'll switch to the communications mode, attach an acoustic coupler to the back of the machine and dial a telephone number in Sydney. The contents of this yarn will zip down the phone line and into the mainframe at the Federal Publishing Company in about five minutes flat. From there it will be transferred, again over a phone line, into a typesetting machine. The previous modus operandi would have been to post a hard copy to Sydney (time in transit: about five days), where it would have been retyped into the mainframe at the cost of another couple of hours. The alternative would have been to telex the whole kit and kaboodle, at a cost of at least $200, or dictate every word to a copy taker (a laborious process that would cost another small fortune in telephone time).

## The Media's New Media

For those reasons, newspapers like the *Sydney Morning Herald, Adelaide Advertiser* and *The Age* in Melbourne have equipped their field reporters and overseas bureaus with NEC 8201A machines.

As you can see, the telecommunications ability is a real boon – and not just for wordy types like me. Consider a sales rep on the road in the bush. He arrives at his pub, types in his orders, requests, memos or whatever, then dials up the head office mainframe ... and bingo, they're in. The boss can process the information and send a new price list down the line using the same telcom system.

## Not Just Knee-Warmers

Nor are the lap machines simply glorified talking typewriters. They are equipped with BASIC programming language, and in recent months aftermarket software houses have devised a string of programs. Some examples for the NEC include MPlan, a full-feature spreadsheet; MSolve, which is described as a unique equation solving program that analyses problems defined by algebraic equations; MBrain, an RPN calculator that will handle basic arithmetical functions, sum and average, exponential and logarithms, growth calculations for sales forecast and compound interest, plus functions for mark-ups, and most other number crunching.

We are led to believe these programs represent the first trickle in a flood, but only time will tell.

With the NEC, buyers receive another set of programs on cassette – six business applications, six utilities, two games and a music generator – at no extra cost.

## Program Capabilities

In summary, here's what they do:

- Memory calculator: A simple program which makes the NEC function as a fairly basic calculator with the ability to accept a string of 100 calculations.
- Text formatter: A program designed to make printer output look better. Variables like page size, headings, ▷

margins and things can be altered. I've tried it, but to me it seems riddled with bugs. Word from the USA suggests a better formatter is on the way. Until then I'm content to print it as it comes, with the only operator variable being the character width.

- Investment portfolio: I haven't used it and probably never will, but the book says it allows tracking of 50 separate stocks or investments using purchase price and current market data.
- Linear forecaster: A goodie. It accepts a sequence of historical data (like monthly sales), and from it forecasts values into the future. Output is both numeric and in bar chart form.
- Loan evaluator: Calculates the missing variable from a loan equation, if it's given the other three. The four are interest rate, principal, repayment and term. Once calculated, it can generate an amortisation schedule from first payment to last, showing accumulated interest, accumulated equity and balance outstanding at any time.
- Character definer: Out of my league, but lets experts create their own graphics.
- Bank switcher: Allows switching from bank to bank on a fully equipped NEC. There are three banks of 32K on my machine. This program lets me jump from one bank to the other.
- Bank accessor: Allows concurrent access to other banks.
- Terminal mode selector: For users who communicate with several different devices, like printers, modems, and different mainframes. It shortcuts access.
- Bar code reader: With optional bar code wand, this lets you read bar codes. Just the shot for the supermarket?
- Schedule keeper: An electronic diary with an alarm function. Seems like a lot of trouble when you can write it in your diary and program your wrist watch to do the same thing.

There's also that music program, a tank game and a snake game. Each program occupies between four and eight kilobytes of memory, once loaded off the tape.

Running late, gotta go.

### Beating/Meeting That Deadline

*Tuesday evening: Hotel Osaka Royal, Japan.* Journey's end.

I'll tell you something. I should have waited to buy all those extra memory chips and the RAM pack till I got to Honkers – could've save a few bob.

Be that as it may, the NEC is working like a charm. I'm so confident with it, I'm not going to bother dumping this story onto tape. I'll zap it back to Sid-on-i (as the operator calls it), then call the boys at home to make sure it's arrived. When I get that confirmation, I'll *kill* the story with a few keystrokes, removing it from memory and freeing up the 14K it occupied to use on other work.

If you're reading this story, then the NEC experiment has been a total success. We've jumped on a plane, written a thousand or so words, switched off and fired up again on foreign soil. We've tapped out a few more words, saved them, then moved on again.

In a second, we'll put the results down the phone line and I'll be able to breathe easy, having met what otherwise would have been an impossible deadline.

Maybe the Tandy, Olivetti and NEC machines have some drawbacks. I don't know. But for my application, they're nothing short of sensational. Then again, I suppose in twelve months some manufacturer will have introduced a machine that does twice as much for half the dollars. Even if that happens, I won't be too disappointed.

As they say here in Japan, sayonara! ❑

your computer
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*Our Big Brother publication, a journal called* **Your Computer**, *has published some memorable stuff in the past year or two – none more profound than Les Bell's summation of the micro. He said: "Computers by definition are either experimental or obsolete". Think about that, and you'll understand why the second-hand computer market is booming. With rapid change, people are upgrading ... or just plain giving up – both of which create a big pool of perfectly good used hardware (and software) at bargain prices.*

By Chris Gable

# "Psst..! Wanna buy a Cheapie?"

Buying a secondhand computer is a lot like buying a secondhand car – if you keep your eyes open you're less likely to get dudded.

With the computer, though, you're probably on a better bet: microcomputers tend to be more reliable than cars, simply because there are less moving parts to wear out.

The microcomputer is evolving so quickly – and people are so rapidly attuning themselves to the phenomena – that cast-offs are inevitable. Once a user has 'outgrown' his or her microcomputer, the urge is strong to up-grade to a more powerful unit. The accompanying budget soul-searching usually leads to the user putting his or her present computer on the market – more often than not via an advertisement in a newspaper: a buy, sell and exchange newspaper (like Sydney's *Trading Post*), or in a computer magazine like *Your Computer*.

Just as you need to know what to look for when you buy a secondhand car, some tips about buying a secondhand computer can save (expensive) problems.

**Secondhand Advantages**

Never let it be said that there aren't advantages in buying secondhand – not the least of which is the fact that a secondhand computer is more often than not sold with its unwanted software and peripherals. Because of the long-standing, scandalous problem of computer incompatibility, software libraries usually aren't interchangeable when a user decides to 'upgrade' beyond a memory expansion board. With luck (from the buyers' standpoint), peripherals will also be incompatible with the more powerful computer on which the seller has his or her heart set.

So you might end up with a microcomputer which suits your current needs or expectations, together with cassette or disk programs, a monitor, disk drive, and other peripherals, with computer books and instruction manuals tossed in – all for less than the price of a new microcomputer without the extras. Replacing the included software alone can cost an arm and a leg, particularly business application programs like word processing packages ($400-$700 new); spreadsheets ($250-$800) or database software ($500 –$1200).

Nine times out of ten, if software is included in the deal, you'll end up with some interesting programs. Most people who buy microcomputers want to explore the potential of the machine with either over-the-counter or self-written programs. As a result, a secondhand computer package deal can include games and applications programs you might not find in a computer shop.

Microcomputers sold new with free business software packages can be excellent secondhand buys for the reasons just mentioned. The original buyer got the software for the price of the computer and usually won't include its replacement cost when calculating a secondhand deal.

Useful bits and pieces, such as printer stands, monitor stands, disk storage boxes, even boxes of blank disks, can also be favourably acquired when buying secondhand. Items such as these tend to be lumped together in the mind of the seller as part of the computer and therefore part of the deal. If the vendor has lost interest in personal computing, the list of extras in the package deal can be a windfall. Some sellers even advertise a service contract as part of the package.

# Psst!

### Who Wouldn't Want A Computer

Similarly, the 'unwanted gift' microcomputer can represent good buying – though, if the computer genuinely is an unused, unwanted gift, don't expect to pick up extra software and peripherals as part of the deal.

You can expect to pay around 80 per cent of the new price for an 'unwanted gift' computer or one that is three or four months old. A computer's secondhand value will have fallen to around half the new price after about 12 months.

So, a micro between three months and a year old should sell secondhand for between 50 and 80 per cent of its new price.

Surprisingly, the unwanted gift computer is often more susceptible to problems than a computer which has been used as it was meant to be used for some time. When people in the computer industry talk about the 'infant mortality rate' of microcomputers, they're referring to the crucial first few months of computer ownership; when, if anything is going to go wrong, it will more than likely happen.

As mentioned earlier, microcomputers are – in terms of moving parts – less complicated than cars. It is an industry axiom that the reliability of a computer increases in direct proportion to the reduction in the number of moving parts. Microcomputers have so far evolved to the stage where the only major moving parts are the keys on the alpha-numeric keyboard. So they are fairly reliable and reasonably rugged if properly looked after.

### Service Contracts

A service contract – which is virtually a service insurance policy for the microcomputer – can be negotiated on a secondhand computer, subject to an assessment of the computer by the dealer or service outlet which issues the contract, and covers basic repairs (and sometimes the loan of an identical computer while yours is being repaired), usually for 12 months. If you intend relying on a computer for your income, the replacement-during-repair clause is invaluable.

Computer service is worth further examination if you are considering buying secondhand (or new, for that matter). In some ways, it is the 'small print' associated with microcomputing. For an annual fee – which can be anything from five to ten per cent of the *new* value of your computer hardware – the service contract guarantees replacement of problem components and can include the loan of a replacement computer while yours is being fixed, or the cost of hiring a replacement during the repair period.

The cost of the service contract is generally around seven per cent of the new hardware cost if you agree to take the machine to the service outlet; around nine per cent if you want a service man to call on you.

The crunch comes with some service contracts when you realise the contract requires your computer hardware to have at least four maintenance checks each year. Again, the cost of these checks is less if you are prepared to take your machinery to the service outlet, more if you want (or are required to have) a service call at your home or office. A maintenance check usually takes an hour or two, and computer maintenance people charge around $40-$50 an hour.

### Have It Checked

If you're buying secondhand you can use that maintenance checking service to your advantage. Most computers have special self-diagnostic software programs which only the service-man can get. Having found the used micro of your dreams, it's a good idea to call the Brand X service outlet and pay the $40-$50 for a technician to run his eye (and his diagnostics) over the machine.

Should a seller object to this inspection (which you're paying for, after all), take your cash elsewhere.

### Ask The Users' Group

As the microcomputer industry grows, so too does the service backup industry. Some telephone directory 'finger walking', or a call to members of a user group organised around the brand of computer you are considering, will more than likely turn up a dealer or service outlet which can help you organise a service contract.

### Beware The Orphan

Find out about service contracts or availability of service outlets for the type of computer you're considering buying secondhand if you can do so. If the computer is a popular seller when new, you can be fairly confident that you'll be able to find service backup. But beware the 'orphan' computer – one which has sold only in small numbers in Australia or is the product of a manufacturer who has gone out of business without selling many units locally. Your first priority (after you've assessed the computer yourself) is to check the availability of service backup for an 'orphan' computer *before* you buy.

Keep in mind, also, that a well known brand of microcomputer will also have a wider range of software available for it, as well as a number of dedicated (specially suited for the computer) peripherals.

### And Now The Bad News

That's the good news about buying secondhand. Now the bad. Never let it be said that there aren't disadvantages in buying secondhand. Because you're not buying new, you won't have the security of a warranty period – pitiful though they may be. Of course, evidence that the previous owner has had a service contract on the computer since new is a reassuring, but don't expect that all is right with the machine because it looks OK. Try everything: the keyboard, the joystick, the monitor, the printer, the software – whatever you can. If the unit is packed away in its box when you arrive to inspect it, insist that it is set up and demonstrated.

If the seller says a demonstration is too difficult to organise, go elsewhere. Similarly, if the seller suggests that a worn keyboard, a damaged monitor, cable, or whatever, is cheap to repair or replace, either look elsewhere or check the repair/replacement cost with an authorised dealer.

Legally, the onus is on the buyer to ensure that the unit is in good working order before buying. *Caveat emptor* (literally 'let the buyer beware' in the Latin beloved

by the legal profession) rules in the buying and selling of most secondhand goods. If the seller has made a point of selling the equipment 'as is', the knot is even more firmly tied. All the more reason to invest in a service check-up and diagnosis.

If you buy a secondhand computer from a dealer (there are some computer shops carrying a big range of used computers) the shoe is on the other foot. Check before you part with any money that the dealer is prepared to give some form of warranty.

### What's The Story?

Your game plan in checking out a potential good secondhand computer buy from a private seller should start with an enquiry about why the seller is selling. We've covered both common answers to the big question earlier: that is, the seller wants to upgrade to a more powerful (or more compact) system, or the seller hasn't hit it off with computers and would rather cash in on the investment, or has been given the computer as a gift and would prefer the money.

All fairly plausible, you have to admit. The unwanted gift computer is probably the most obviously detectable of the three selling excuses because you should be able to know as soon as you see the unit if it is brand new or not. Still ask for a demonstration, though – a person who has genuinely received the computer as an unwanted gift probably won't have used it and probably won't even know how to switch it on. A person who has dabbled with the computer – possibly causing some damage through careless treatment (beginning what computer people call the 'Time Bomb Factor', which means problems have been set rolling and could show up later) – will more than likely stumble through a few attempts at installing a program, shooting down an alien invader, or something similar.

If the seller suggests that he or she has outgrown the computer, watch carefully during their demonstration. They should obviously know the capabilities of the computer and will be able to demonstrate it thoroughly. Apart from showing you how honest the seller is about having outgrown the computer, an impressive demonstration is worthwhile in itself; you'd pay money to have a similar demonstration done professionally. Regard it as your first lesson with the computer (if you aren't already aware of its capabilities) and take notes by all means.

### Had Any Problems?

Ask if the seller has had any problems with the computer and take details of repairs, if any. Make sure all the cables and manuals are with the computer (the first are expensive to replace, the second impossible to be without).

Itemise the parts of the 'package' which is for sale – the computer itself, the software, peripherals, stationery, books and manuals, and so on – and weigh them against the asking price and the new price.

### Research It

If you have an idea of the type of computer you want to buy, read all you can about the unit (in books, back issues of *Your Computer*, at your local library, or wherever you can find information), and you'll be better prepared to ask pertinent questions of the seller. Your research should also tell you important things – like whether or not memory can be expanded – which the seller might not know. Or might not want to tell ...

The 'upgrading' argument can be valid for reasons touched on earlier. The rate of development of microcomputer technology is such that any micro is virtually obsolete from the day you buy it. America's man-on-the-moon computer had only 16K of memory and filled a good-sized room. Downsizing has taken place only in the past three or four years (who knows where it will end) and memory capabilities in increasingly smaller microcomputers have gone through the roof. Hard disks are rewriting microcomputer history daily and laser disks look like stretching already stretched imaginations even further.

In short, rapid advances in computer technology are sweeping a lot of computer users along with them. If you are prepared to acknowledge the fact that you need to start computing somewhere, and are realistic about buying an interim computer which will help you learn, you can save a lot of money by buying secondhand. Similarly, if your perceived needs involve a computer which someone wants to discard because it isn't powerful enough for them, or doesn't suit their applications, you can save money – and possibly find what had originally been an expensive computer in its day – by searching the 'Computers for Sale' columns.

But be sure to keep your eyes wide open and your money in your pocket until you're satisfied that all is as it seems. If you have any qualms, don't buy – there'll be no shortage of microcomputers on the secondhand market for a long time to come. ❑

# OPTIONAL

Pic - Courtesy of Dick Smith Electronics

*So you've bought a computer. And there it sits. Can't do much except get a little warm when you switch it on. This article looks at some of the accessories, peripherals and relevant paraphernalia which will allow you to make the most use of your purchase (yes, yes, by purchasing more). It could also be described as a confidence tablet: when digested it will help you deal with the smiling-smoothy salesmen you are bound to encounter when shopping.*

By Evan McHugh

By now you should know the computer is just a thing that manipulates obscure strings of 0s and 1s and beeps occasionally when you press that red key on the side that says 'Do Not Press'. You can only talk to it with the help of some kind of input and output device. If this is the only computer article you've read, an input device is one that lets the outside world talk to the computer ... and an output device is one that lets the computer talk to the outside world.

Let's look at input devices first, since you probably have a lot to say to the computer; like, "Why do you cost so much when all you do is sit there?", or "Let's play Space Invaders."

## Input Devices

The most common input device is a keyboard. It's usually just like a normal typewriter keyboard, although it will often have some extra keys with things like 'ESC' or 'CHAR DEL' on them. Don't worry, I've been programming computers for years and I still don't touch some keys if I can avoid them. Most small computers have a built-in keyboard so you won't have to buy one. As input devices go, they are good for conveying instructions to the computer, one at a time. While they're currently the quickest method for person-to-computer input, there are others – like voice synthesisers and joysticks.

A small number of voice synthesisers is available and while some can recognise a limited amount of human speech input, they are still only rudimentary and quite expensive.

## The Joy Of Sticks

Joysticks on the other hand are quite common . They're the preferred method of playing a great many games. Joysticks are basically a post on a base, with a trigger or button of some kind that allows you to fire. The post is moveable and is used to control your man, camel, space ship or other 'thing'. Forward on the joystick means up on the game.

The price range for joysticks spans $15 for a basic unit with fire button, to $50 for the latest offering —the Wico Command Control which has a weighted, specially moulded grip and ergonomically designed joystick. The major distinction between the various joysticks is their sturdiness. The cheaper ones tend to be more easily breakable. The more expensive ones, like the Wico, can be found in arcades where they take a beating and survive. A joystick like the Pointmaster $29.95, serves most people who can control themselves reasonably well.

There are some interesting joystick variations. The best of these is Le Stic. This is a mercury controlled baseless joystick. It means you can just hold it up and tilt it in your hand. The freedom of movement is, as a result, much greater and allows you to get into the game even more. Le Stic sells for around $70. Trac-Ball is a sphere that you rotate forward and backward, or from side to side, to control your movement. ▷

# EXTRAS

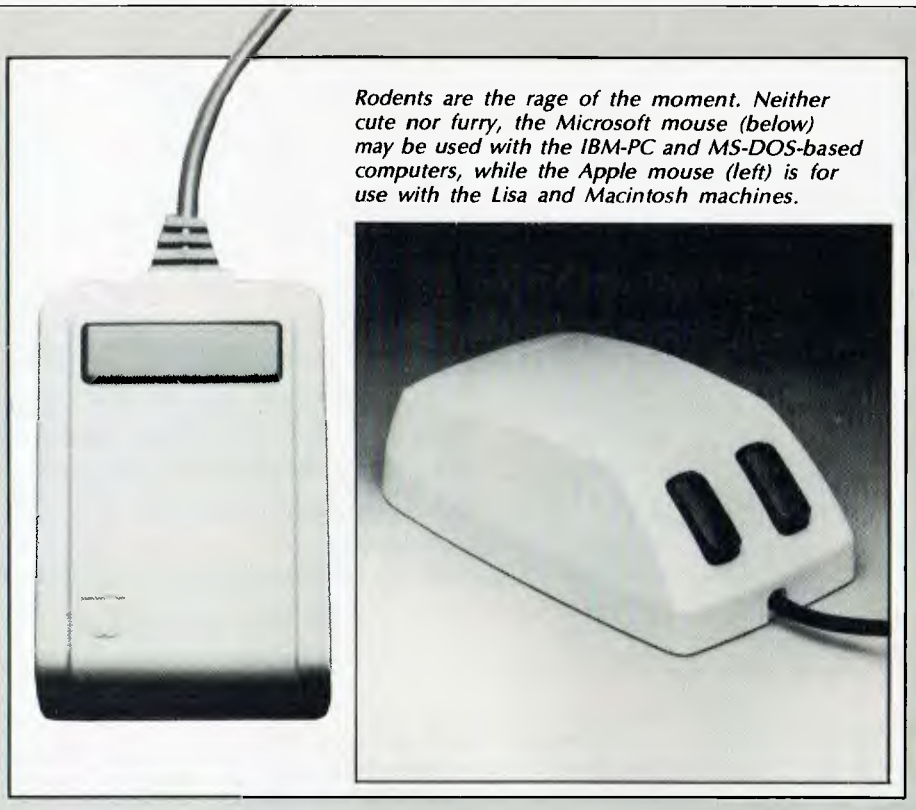
These cost around $50. Another device is a game paddle, which allows movement in two directions and usually has a fire button, for around $25.

### Animal Input

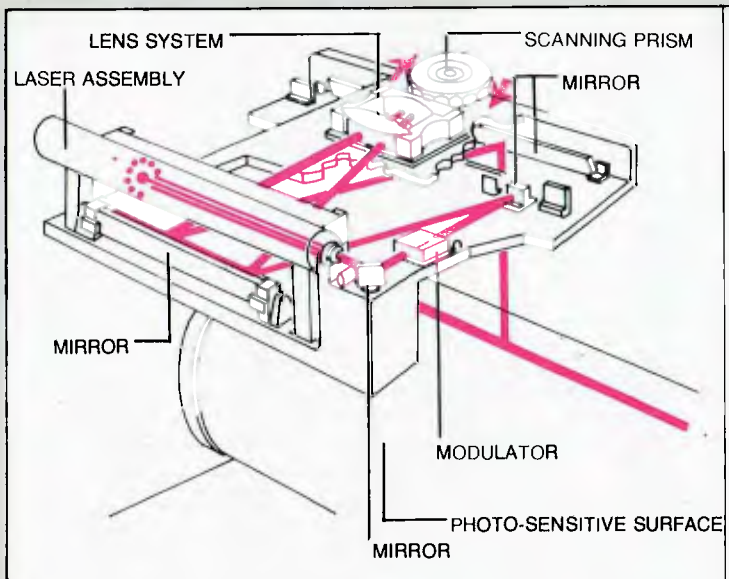
Another recent development, which has serious applications in spite of its name, is the mouse. Why is it called a mouse? Who knows. It looks as much like a mouse as a Jumbo Jet looks like a US spy plane. The mouse is a small box, with one or two buttons on top that rolls across the top of your desk. As it moves, a cursor of some kind moves on your computer screen (computer screens are output devices which I will describe in a moment). A lot of people think a mouse is useless, but they're the coming trend. Every laid back manager has one, don't you know?

Mice are found on the more expensive machines, but are becoming available on home computers as well. A package for the Apple IIe computer costs $250 and provides you with a mouse, a plug-in computer board and a software package to run the mouse.

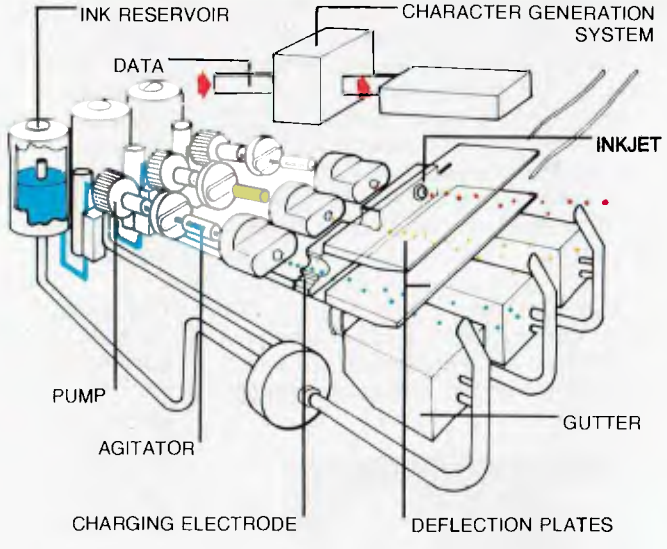
Another seemingly odd little device is the Koalapad. This is a small black pad which you touch with your finger. By moving your finger about you can move a cursor or indicator on your screen, much like you can with a mouse or a joystick. Koalapads will work on Apple computers and cost $179. As you may have guessed, the Koalapad is made in Australia.



*Rodents are the rage of the moment. Neither cute nor furry, the Microsoft mouse (below) may be used with the IBM-PC and MS-DOS-based computers, while the Apple mouse (left) is for use with the Lisa and Macintosh machines.*




*In a laser printer, as the beam of coherent light emerges from the laser, it passes through a modulator that regulates intensity. A series of mirrors leads it to a prism which sweeps it over the photosensitive drum to form an image line by line, as in television. The image, now a pattern of charges, is transferred to paper and attracts toner that is fused on by heat.*




*In an ink-jet printer, ink is pumped from a reservoir, filtered, and broken into tiny droplets by an ultrasonic agitator. Droplets issuing from the nozzle acquire a charge from the charge electrode, under control of the character-generating system. Passing between the charged plates, the droplets are deflected according to the charges they carry and are aimed to the appropriate places on the paper.*

### Driving You ...

There are other input devices that are not human-to-machine devices. These are either cassette drives or disk drives. They are used to input often-used data or programs which you don't want to retype every time. For example, a game like Space Invaders will be stored on a cassette or diskette and can be loaded into the computer for you to play. To type it in would take a day; to load it off a cassette takes about three minutes; loading off a diskette, about 20 seconds.

A cassette drive is just like a cassette player. In fact, if you have a cheap cassette player you can use it instead of buying a new one. Some of the cheaper brands are actually the best. You can expect to pay between $50 and $80 for a cassette drive. Their main problem is speed – or a lack of it. They can also prove unreliable . If you get an error while reading-in data from a tape, you will have to start over again ... and again ... and again. This can get very frustrating. Cassettes also require a lot of fiddling before they run properly. You have to get volume just right to get the data to load, and some things just won't load at all if they become damaged on the tape.

Because they are cheap, however, cassette drives are the most common input device for data and programs. Most people who own computers dream of the day when they can buy a disk drive. These start at around $399 and can cost up to $699 or even more. The price will depend on the type of computer and the type of disk drive you buy. While price tags are falling, disk drives are still worth more than a lot of computers . You can buy disk drives for all the popular computer brands, such as Apple, Commodore and Atari.

### Storage Media

Disk drives store information on a thin plastic disk with a magnetic coating. They are quite reliable, but, better than that, are very quick at storing and reading data. The diskettes cost about the same as cassettes, but should be handled with care. Never touch the surface of the diskette, you may permanently damage the diskette and have to throw it away along with the programs and data on it.

Popular brands of diskette include Verbatim, Control Data, BASF and Nashua. They all cost around $44 for a box of ten.

You may have noticed it is possible not only to input using cassettes and disk drives, but to output as well. This means you can create things using the computer, and save the result onto the diskette or cassette. What you create may be a program, a picture, or it can be some information from a game you are playing . If you have a disk drive, you will notice that sometimes it will start whirring all by itself. No problem: it simple means the drive is loading another program or some more data.

Data, by the way, is just what computer people and American marketing executives call information. Data can be lists of your girl or boy friends' telephone numbers, or a list of ways to avoid paying tax using a computer.

### Output

Let's have a look at output devices. How does that little bundle of joy, your computer, talk to you? The most common, and some would maintain the best, way is through ▷

# Tangible Output

One possible addition to the array of toys you buy for your computer is a printer. Printers come in all shapes and sizes. The ones that give the best quality print are daisywheel printers. These print at around 20 characters per second. They are quite costly. Cheap ones, like the Brother HR15, cost around $845; while an Apple II daisywheel will cost you $3200. Daisywheel printers work by spinning a wheel with the letters on the edge. As the required letter passes the position where it should be typed a hammer hits it and the carriage moves to the next position.

The most popular small printer is the dot matrix. These printers don't produce output of as high quality as a daisywheel, but they are fast. Cheap dot matrix printers will go at 80 characters per second. They work by having a line of nine wires arranged vertically in the print head. As the print head moves along, the wires fly out and hit the ribbon to build up a dot pattern in the shape of the required letter. You can expect to pay around $550 for a dot matrix printer such as the Epson RX80. The Epson will print at 100 characters per second.

Another kind of printer is the thermal printer. These produce an image using special heat sensitive paper and a print head that turns hot spots off and on as it passes over the paper. These print at around 40 characters per second. The great advantage of thermal printers is that they are very quiet. That means you can take them out on commando raids without alerting the sentry, or print a letter late at night without waking up the neighbours. A Silentype thermal printer for an Apple IIe costs $625.

A variation on the printer theme is the printer plotter. Printer plotters are useful for putting line drawings of computer graphics on paper. They can print charts, shapes and so on. They work by moving a pen around on a piece of paper; or by moving the pen left and right while moving the paper up and down. They can be used to draw from one specified point to the next in a straight line. By drawing very short lines, curves can be produced – so you can draw sine waves and the like. Printer plotters can be used to draw fabulous graphics and patterns. You can get into plotters from about $400 for the Atari 1020 (which works in four colours) to about $1500 for the Apple Colour Plotter.

*Video Technology's 'High-Res' amber monitor with tilt-and-swivel stand.*

*Roland's CB-144 Color B monitor has a 35 cm colour display, a built in amplifier, speaker and headphone jack.*

*The Prince is a 30 cm amber monitor. Its controls are mounted under the flaps on top of the case.*

your screen. A computer which can use a TV screen is particularly useful for some people because they don't have to buy a screen if they already have a television. Not all small computers will let you use a television screen. In this case you will have to buy a special monitor. Even if you can use a television, you may buy a monitor because you want to play Pacman and some other member of the family wants to watch 'A Country Practice'.

Monitors come in a range of prices and types. A good green- or amber-screened monitor, such as a Kaga or an Amdek, will cost around $300.

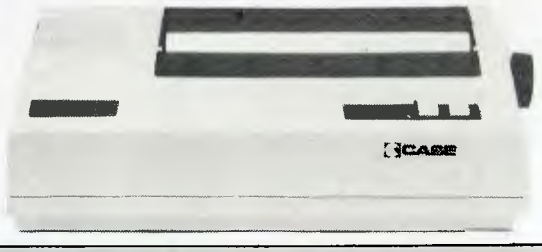
## Modems

Another area of interest is modems. A modem is a device that connects your computer to a telephone, so you can send or receive data to or from other computers. There are two kinds of modem: direct connect or acoustically coupled. Both eventually send electronic signals down the phone line. The direct connect variety receives the electronic signal from the computer and sends it straight down the phone line. The acoustic coupler, on the other hand, receives the signal, converts it to sound which the phone then reconverts to an electronic signal,

*The Pony thermal printer from Oscwell International is available with RS232, Centronics, and special Atari and Commodore interfaces.*

*The Juki 6100 letter-quality daisywheel printer from Mitsui Computer Systems retails for around $1000.*

*The Case STX-80 thermal printer.*



# EXTRAS

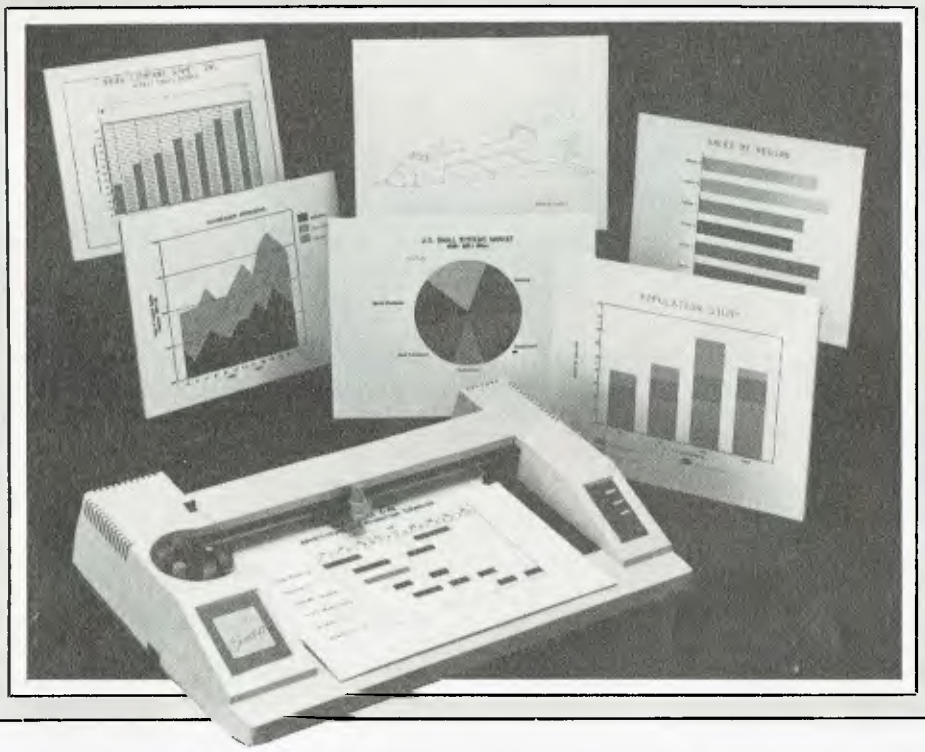
which is then sent down the line. The most common method is direct connect, as it reduces the chance of data corruption when your two-year-old discovers the phone and starts treating it like a toy. Modem prices are dropping and can cost as little as $239, for the Cicada 300.

## Other Bits and Pieces

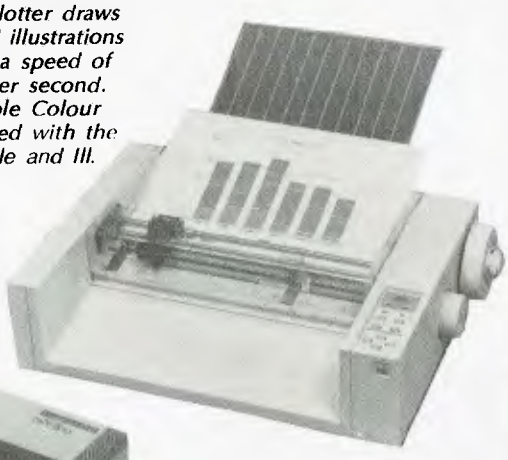
When you buy some of the abovementioned items, or if you're out looking for some facility your basic machine doesn't have, you will find a whole string of other products to buy. These may include extra memory, so you can get bigger programs into your computer; expansion boards, so you can attach more peripherals to your computer; colour cards and so on. There are hundreds of these last, so we'll only be able to look at a few of the more common ones here.

## Anyone For Cards?

Expansion cards allow you to have a number of peripherals connected to the computer. The card handles all the calls to the various components and responses to the computer. If you know that you will be going in for many bits and pieces, it will be worth your while to get an expansion card. A typical expansion card is the Atari 850. This costs $350 and gives you capacity for four RS232 Serial devices and one parallel device. ▷

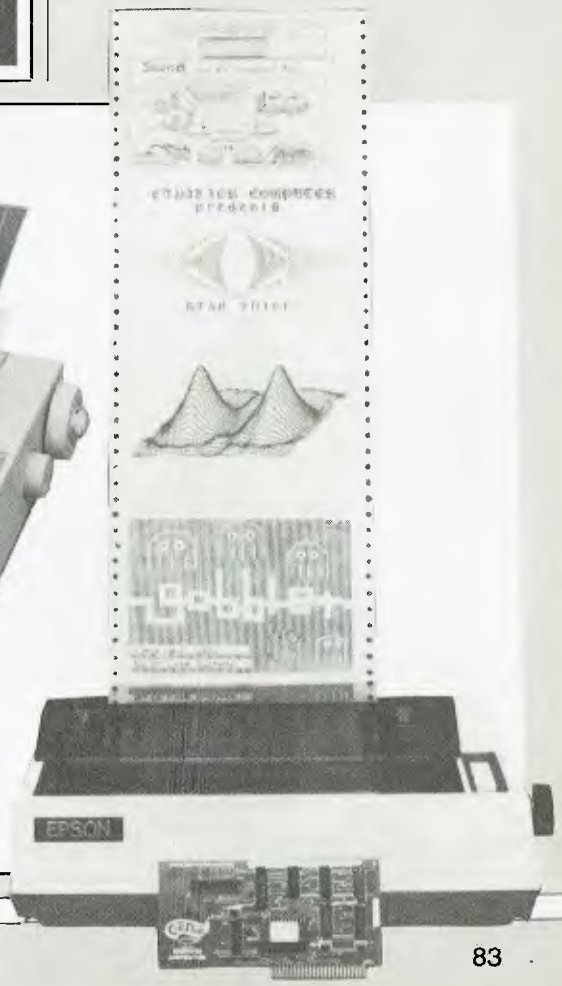


*Above: The Sweet-P Six-Shooter graphic plotter draws charts, graphs and illustrations in six colours at a speed of 35 centimetres per second. Below: The Apple Colour Plotter can be used with the Apple II, II+, IIe and III.*



*Left: The Roland DXY-1C1, one-pen plotter (standing) and the DXY-800, eight-pen plotter.*

*Right: Epson's MX-80 dot matrix printer.*



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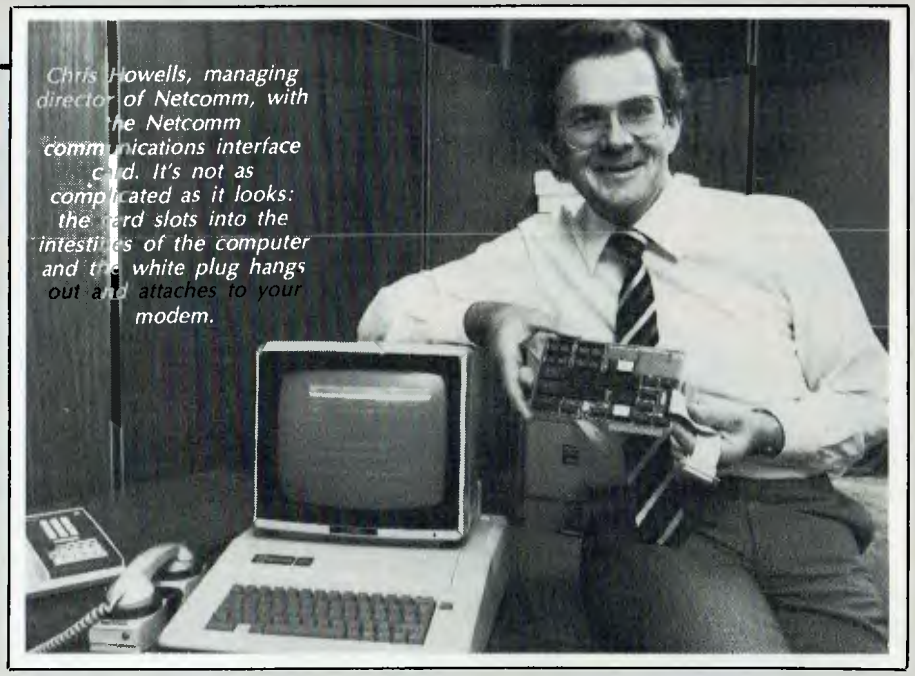


*Chris Howells, managing director of Netcomm, with the Netcomm communications interface card. It's not as complicated as it looks: the card slots into the intestines of the computer and the white plug hangs out and attaches to your modem.*

'Serial' and 'parallel' refer to the type of data transfer that is being carried out.

Column cards give different types of display on your screen or monitor. Many home computers display text at around 40 characters per line. It is possible to buy a card that will display more text – say, 80 characters per line. The theory is the more text you can see on the screen, the better. Many machines do not support this modification. Apple does with the Apple IIe 80-column card costing $180.

You will often find, within a short time of buying a computer, that you have outgrown it. The solution to the problem may be to purchase more computer memory so you can store bigger programs. Nearly every machine can be upgraded when it comes to memory. There are some limitations, however, so when buying your computer in the first place, try and get the biggest K capacity you can afford. It might seem excessive at the time, but in six or twelve months you'll be glad of it.

Memory cards usually start at around $200 dollars for an extra 32 Kbytes of memory, and go up from there. A digicard for an Apple II will give you 16 Kbytes for $149. A 32 Kbyte memory card for the Texas Instruments 99/4A will cost $200.

When you buy a new peripheral, it may already be supported on your computer. Often there are plugs on the back of the computer that will allow you to connect the printer. If not, or if you have used up all the plugs, you will have to buy an interface card to connect it. I've already mentioned some interface cards, like the mouse cards and expansion boards. You can also buy cards, like the Apple parallel interface card for $228, which will let you connect an additional component to your computer. Other cards will let you plug in joysticks, extra monitors and plotters.

The last group of cards is the buffer cards. These are used to store data sent to devices such as printers, so that the computer can get back to you while the printer continues doing its thing. This means you can go on with the next job while the printer completes any output from the last one. These buffers vary in size from 16 Kbytes to the more common 64 Kbytes. You can get hold of a printer buffer for as little as $299, although your average unit weighs in at about $500-$600.

### Cleanliness And Your Computer

A computer needs to be kept clean, especially the internal parts of the disk drive and cassette drive. Any dust in either of these two can cause catastrophes. One product that will give your computer a good clean is Pro-dust Off. This costs about $16 a bottle and is available from photographic dealers. It is highly compressed air that will blast dust from every nook and cranny.

For an all-round clean, you can buy a computer cleaning kit. These contain diskette drive and cassette cleaners, lint-free wipes and non-corrosive cleaning liquids. The Microkit, for example, will leave your screen, diskette drives and cassette drives squeaky clean for $39.50.

### Getting Information

This article is by no means the final word on peripherals. It has, hopefully, given you some idea of what you can buy to optimise the use of your computer. The best way to find out about peripherals is to ask your local dealer for a copy of his price list. This is often a good indication of how on-the-ball a dealer is. So, if nothing else, you will get to know if he is organised enough to help you when you need him.

Many suppliers also advertise extensively in publications like *Your Computer*. The news and review sections of such magazines will also help you keep track of what is going on. ❑

# True-life Computing

By Chris Gable and Phil Scott

*Buying a micro is a bit like getting married – exciting, new and different ... until the first blush wears off. So we looked at a few computer newly-weds to see if the marriage of micro and man can really be the sheer bliss they promise us in the advertisements. The results of our impromptu survey range from a marriage made in heaven to one that looks like it's headed for the rocks. First the good news ...*

Charlie Foxx, Music Director of Sydney's Rock of the Eighties radio station 2SM, owes his ascendancy in rock radio to a flair for music programming, a personal microcomputer and a dream that woke him at 3 am.

Not just any dream, though; Charlie's dream weighed his rudimentary knowledge of BASIC programming against the drudgery of manually plotting the music, ads and talk that made up his radio show ... and woke him with a solution.

Charlie went straight to his Commodore 64 and rattled off a program which revolutionised 2SM's music scheduling. The manual process which he and the other disc jockeys had used before that morning immediately looked like something out of the Dark Ages. And 29-year-old Charlie became Music Director material.

**Rocking Computer Foxx**

Charlie Foxx lives rock and roll; from his tousled, dyed-red hair, jeans and tennis sneakers to the ground-shaking in-car sound system in his little Laser Sport. For a time after he'd bought his first microcomputer, he also lived computers.

"Every spare hour went into learning to use the thing," he says.

Charlie's computer program worked its way into his dream only six weeks after he'd bought the Commodore. As a disc jockey, he'd started dabbling with 2SM's Shafer sequential Radio Automation System computer (which automates the advertisements) and became interested in computers and computing.

A friend then gave him a copy of the book The Soul Of A New Machine, the account of the Data General Corporation's race to develop the 16-bit Eagle microcomputer. The book mentioned adventure games and Charlie found that the games were available for the Honeywell computer system used by the radio station's accounts department.

"I started playing adventure games on the Honeywell and became fascinated," Charlie said.

The inevitable followed, with Charlie first looking at buying a secondhand Dick Smith Wizzard, then considering a Commodore Vic 20, and finally settling on the Commodore 64.

The Commodore's cassette system soon gave way to a floppy disk drive and Charlie graduated to the frustrations of Zork and similar adventure games, teaching himself some of the rudiments of BASIC programming between confrontations with nameless terrors.

**Wheeling Round The Bend**

But Charlie felt the frustrations of the US-sourced Wheel Chart system of manually scheduling his radio show were infinitely worse than those of the adventure games he was playing after work.

"Drawing up the wheel charts was bad enough because it took so long," he says. "It was taking roughly two hours to schedule an hour of music, which is silly in anyone's language. But trying to follow the charts while I was on air was heading me towards a nervous breakdown.

"Wheel charts are still used in America, but I thought there had to be a way to get the whole thing on computer."

Charlie made a few attempts at writing a program to help with his music programming problems, but struck out every time – until the elements came together in his dream.

"It sounds silly but I suddenly woke up around three o'clock one morning with the solution," he says. "I hopped out of bed and started tapping out a few things.

"I had very, very basic knowledge (excuse the pun) of programming in BASIC – I had no idea about things like print statements – yet the foundations of the program were there. I played with the idea a bit and it seemed to work, so I went into the 2SM office and typed out the Commodore for about 60 hours straight."

He used 2SM's Commodore P and its printer to print out the

# True-life Computing

program. (At the time of our interview, Charlie still didn't have his own printer.)

### Programmable Discs (sic)

The result was a program which allowed Charlie to plan his three-hour radio show in a few minutes, instead of taking him the best part of a working day, as it had done with the wheel charts.

"I don't really understand how it works or why it works. But it works," he says. "I've tried writing other programs since I came up with this one, but they don't work. I guess it was just a bit of inspiration in the middle of the night."

The prospect of the nervous breakdown dropped out of sight and 2SM management was so impressed with Charlie's mastery of the music programming of his radio show that he was offered the job of Music Director.

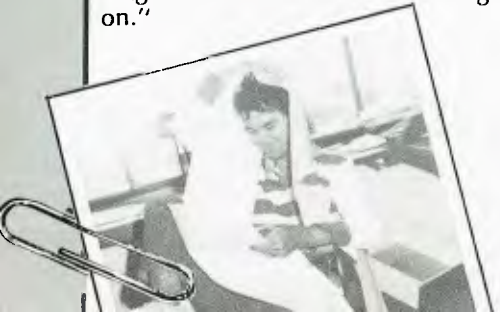
"Now it takes me about 45 minutes to program 24 hours of music," Charlie says.

Charlie Foxx's computerised music programming has changed the way 2SM's disc jockeys work – and nobody is complaining. It has eliminated a tiresome manual job and well and truly introduced the disc jockey's job to computer technology.

"Computers have shown plenty of potential in radio for a long time, but application software hasn't been available," Charlie says. "I suppose it's possible to adapt other programs but I'd rather do it myself – I see it as a challenge. It's exciting.

"I'm now working on further developing my program to get it to make a random selection of gold tracks. I also want it to handle the requests people phone in on 2SM's 24-hour request line.

"Eventually, I'll just press a button and it will print out forever," he laughs. "That's what I'm working on."



### Insurance Ignominy

When a livewire team of young insurance agents decided to computerise their growing business, that's when their troubles began; troubles which seem to get worse rather than better, and which highlight one of the major pitfalls of the microcomputer business – a lack of support for the hapless first-timer.

John O'Kelly, Brendan Monkford and Linda Kosowski just want a microcomputer that does what they want it to do. More specifically, they want *software* that does what they want it to do. And they don't think it's too much to ask.

Their recently-acquired Morrow Micro Decision has the goods, they feel, but their software just isn't up to the job; even though the salesman who sold them the package promised the world.

### Promises Promises

"These computer salesmen promise the earth and tell you it's very simple for the layman to operate the machine," says Oxford-educated, cockney-accented John O'Kelly. "It all sounds great in theory, but the facts of the matter are that we've got $8000 worth of equipment sitting there that isn't doing the job. If it did all the things we were told it would do, then we wouldn't have any arguments with it."

### Frustration, Disappointment, Thump

John, Brendan and secretary Linda are frustrated because they believed a microcomputer was the answer to their insurance agency filing and data retrieval systems problems. To make matters worse, John and Brendan feel their attempt to computerise their files has yet to start making them money.

"So far, it's done nothing but cost us time and money," Brendan says.

As things stood at the time of our interview, the progressive young men from the National Mutual office in the outer Sydney suburb of Liverpool were ready to thump some desks. They'd bought their Morrow Micro Decision in November last year because they believed it would do what they wanted it to do, given the software recommended to them by the salesman, and because they liked the idea that the Morrow could read software from other machines if it had to do so. John and Linda spent one day each week with the salesman, learning how to operate it. Brendan was happy to let John and Linda learn the ropes while he got on with writing insurance policies.

But then things started to go wrong.

When asked to specify the problem, John and Linda echo the word 'software'.

"I think the idea of a computer is great, but at the moment it is taking us more time to operate our computer than it was using our manual system," John says. "The man who sold us the system has told us there is an error in the program we most want to use, yet so far he hasn't been able to come up with a solution.

"I'm convinced that the computer itself is a good unit," he says. "It's the software that is giving us all the problems.

### What The Software Won't Do

"We have a filing system, a diary system and we have to type out individual letters," he says. "One of the things we wanted the computer for was to enable us to put in standard letters and have them individually addressed and personalised. We wanted to be able to send out renewals, start mailing

campaigns and, of course, transfer our files and diary system onto the computer."

"It won't do what it is supposed to do," Linda says. "As it is now, we have to call up policies manually and have them printed out, rather than being able to give the computer two dates and asking it to print out all the policies written within those two dates. We've had problems with the thing where it has wiped out disks (which meant we had to type all the information in again), problems when the machine goes down and just won't work."

"The most annoying problem," says John O'Kelly, "is what the computer calls 'Lost Data Integrity'. It should all be a lot simpler than it is.

"I have a friend with a video shop who is sueing the maker of his computer because he has exactly the same problem as we've got – he can't pull up his customers on his computer. If it goes into error, it takes him ages to get the thing back up again.

### Inaccessible Data

"Now we're having trouble not only putting information into the machine in some instances, but in trying to get that information out," Brendan says. "And that's a worry because we've had Linda put most of our files onto disk and we've just tossed the originals out. Why keep bulky files when you can store them on disk? Now we can't get a lot of that information out of the computer.

"It's going to cost us money and that's what really upsets me."

John and Brendan both felt they would have to return the software they bought with their computer and either demand their money back or sue the company involved.

"Then we'll have to get somebody in to get our programs set up correctly and to train Linda correctly," John says. "Hopefully, then we'll have a smooth operation – which is all we really want. Once we smooth out all the bugs, the computer should help us increase our output and give us more time to be out in the field. It should spit out all our renewals, it should spit out all our clients for six monthly review, and it should help us with mailing campaigns and in other areas.

"But all we can do with it at the moment is put files into it manually and get them out on the printer."

### Computer Prejudice

For some unexplained reason, the computer won't accept the name of at least one of John and Brendan's clients, even though the information they need about that client is filed under his name. The number of characters in the file name is correct and the man's name is common, yet the 'Lost Data Integrity' display appears on the monitor screen every time the name is typed on the keyboard.

"The man who sold us this system has offered to help us get it right, but I think he has too much on his plate and is trying to make as many sales as he can," John O'Kelly says. "Which is fair enough, I suppose, but it is hurting the customers in that he's not providing any backup service.

"I don't blame the bloke who sold us the software as much as I blame the people who are supplying it to him. I think there are a lot of problems in the computer industry. And one of the major problems is that it is growing so fast. There are a lot of computer shops opening up —like video shops – but some of the people who are opening these shops are incompetent. It's like every other new industry – you get so many incompetent people making a quick buck. They know a bit about what they're selling but they can't organise it properly for you.

"If this computer and its software did all the things we were told it would do, then we wouldn't have any complaints with it. I can see its potential, but at the moment we are frustrated by the whole exercise. It's no good having a machine if you can't use it. It's even worse if a machine that is supposed to be a time-saving device starts costing you time and money."

### Casual Computer Kid

Perhaps young Anthony Woodward best illustrates what the so-called computer generation is all about. To Anthony, computers are just a useful tool. They're certainly nothing to be feared.

Anthony Woodward is 15, going on 16. He is a Year 10 student at a progressive Sydney highschool with a computer room. He is a level-headed, well-spoken young man who has already started filing on computer his observations about insects. That information will help him when he is a professional entomologist.

### Computerising The Bugs

He and a few school friends have written an 8000-line program to help them classify invertebrates for their science classes. If all goes well, the program should find its way into a soon-to-be-published book on educational computer programs. All of which is impressive as far as adults are concerned, but fairly matter-of-fact for Anthony who refuses to regard computers as anything other than a useful tool.

Anthony plays computer games (like most adults with microcomputers), but considers them merely enjoyable steps on the path to learning how computers can best serve him.

Anthony started using computers at the age of 13. His school had an Apple II Europlus microcomputer and Anthony spent most of his lunch hours learning to use it. He started programming computers

# True-life Computing

midway through 1983, when he and several other students discovered they had a common interest in computers and formed a programming group.

"We were assigned a project in Science, which involved invertebrate classification and decided we'd try to write a program for it on computer," he said.

Anthony and his friends spent two months with their heads buried in research books and computer manuals and completed the 8000-line program just before school broke up for the Christmas holidays.

"It took 15 seconds to list," he said. "And even though it had a few bugs in it – you have to expect a few bugs in an 8000-line program – I feel I learned a lot about writing BASIC programs."

### Money For More Micros

Anthony's school held an end-of-year fund-raising festival which raised enough money to help the school buy more microcomputers for student use. An order was put in for 10 BBC Microbees and another Apple II Europlus, this time with a printer. A computer room was set aside and the facility was due to open in early 1984.

But that was a long way off, and Anthony had the problem of how to get through the interminable Christmas holiday break without a computer.

A Christmas gift solved all that. Anthony's parents gave him a Sinclair ZX81, cassette recorder, monitor and 16K extension pack. Anthony's father Brian, a writer/editor/engineer/electronics expert, was already using a microcomputer and wanted to encourage Anthony's obvious talent for computing.

"I didn't expect to get a computer for Christmas and I'm very pleased with it," Anthony said. "It has already proved invaluable and I like the fact that it has an RS232 interface port which takes extension RAM packs.

"So far, I've used it mostly for computer games – which help me practice my typing – and for practising BASIC programming".

An insect classification program has already been drawn up, with Anthony recognising that research done now will help him in the future.

### A Means, Not An End

He sees computers as a useful aid – though not an end in themselves – in his future scientific career.

"I want to be an entomologist," he says. "And that is why I'm making a file: so that I can start *now* by filing insects and insect groups. Instead of filling notebooks with observations on all the insects I've found and the things I've learned about them, I'm going to file the information using a computer.

"I'm still learning a lot of things about programming computers by working my way through the Sinclair user manual," he says. "When I'm practising writing a program from the book, I often find a new application for it."

Anthony doesn't feel he is mathematically inclined – though he loves Science – and he regrets the fact because he says knowledge of mathematical formulae offers shortcuts for computer programming. Mathematics, he says, also teaches a unique form of observation which he feels he doesn't have. Still, with Anthony's appetite for learning, it shouldn't be long before his computer programs have their own shortcuts.

He is happy with his Sinclair ZX81 – though he says the touch-sensitive keyboard isn't ideal for learning to type – but feels BASIC is becoming, well, too basic for him. His ideal computer for the future would be 'clean' (without an inbuilt computer language) and would be programmable in whatever language the programmer wanted to use.

"I'd definitely use Machine language – when I learn it – because it's so much quicker than BASIC," he says.

With the computers at his school and a backup microcomputer at home, Anthony hopes to keep learning how to best use computers in his future professional career.

### Life Before The Micro?

"Once you start using computers, you can't imagine how you did things before them," he says.

Anthony's next project on the Apple at his school involves joining with his computer-aware friends to write a program that teaches people, "in English", how to use the computer.

He and his friends believe commercially available programs aren't straightforward because they assume too much on the part of the beginner.

"There are commercial programs available but we want to do our own," he says.

### Trusty Typewriter Triumphs

Somewhere betwixt and between true bliss and frustration is a writer who acquired a micro ... but still uses his typewriter for certain jobs. He says the typewriter is quicker. Experienced Wordstar users will find that hard to believe. Yet who's fault is it that the full power of one man's word processing software remains unlocked? The dreaded double-speak instruction manual strikes again.

Australian motoring writer Bill Tuckey started using a microcomputer in September last year, after 30 years of working with a typewriter.

He'd used a typewriter in his capacity as founding editor of *Wheels* magazine and to help him write the millions of words which have appeared in thousands of magazine and newspaper articles, and nine books about Australian motoring and motorsport.

Tuckey does a lot of his thinking in front of a keyboard.

Yet word processing and microcomputers have come fairly late in his career. His attitude to them is as interesting as it is enlightening for writers who are considering the switch to microcomputer word processing. Even now, he feels his typewriter still plays an important part in his work.

### Revving Up To Technology

"I bought an Osborne Executive late last year, basically because I didn't

want to be left behind by technology," he said. "I could see some opportunities where I felt I could use the thing, although I wasn't sure. I'm still not sure.

"It became quite a fad among journalists during 1982/83 to buy the small Brother keyboards and use them to write in aircraft – because they were quiet, and you could fit them in a briefcase and lug them around. I felt they were good for newspaper journalists, which I'm not.

"When talk turned to things like acoustic couplers and modems and the like, I could see how the technology could be handy; particularly in its major function for me, which is getting clean copy to a typesetter," Tuckey said.

"I'm quite sympathetic to computers and I can see their uses. Microprocessor formats in motor vehicles is one use I'm very familiar with. My children are not of the school age where computers have become toys and a familiar working tool, so computers haven't been a part of the house, as such. But I was familiar with the way computers operated and I was quite interested in them before I bought mine.

"I bought the Osborne because I knew it was working well for other people in a similar position to myself and because I felt it was a writer-sympathetic unit which seemed to be reasonably well-suited – with Wordstar and so on – to do the job."

## The System

Bill bought the Executive, an Epson dot matrix printer, a monitor (which he still felt he needed, despite the screen being larger on the Osborne Executive than on the Osborne 1), and an Osborne acoustic coupler. Of the software that came with the Executive, he uses Wordstar and Spellguard almost exclusively.

"I'm working now on converting Spellguard into a style checker rather than a spelling checker – because I have no trouble with spelling, anyway," he says.

"For a writer, the problem with Spellguard and all the other software is that they are American systems. My style – and the style used by a lot of Australian writers – is almost half-and-half of English and American styles."

As a partner in a new publishing firm, Tuckey feels his Osborne will help most in his book production work. Recent books from his pen include *Australia's Greatest Motor Race*, three volumes of the *James Hardie 1000* book, *Australian Motoring Year*, *Australian Off-Road Year* and a yearbook on sailing in Australia.

"The computer's only major value to me is that it by-passes a whole book production system by going straight into a typesetter through a modem," he says. "Also, my computer can communicate with computers being used by other writers who are contributing to the books. That'll be handy."

## The Word's Worth Of It

Tuckey feels, however, that his computer package has yet to prove its worth.

"The problems I'm having with it revolve around the instructions – even the basic instruction book and the instructional cassette tapes," he said. "They don't explain things properly, particularly to an older user who hasn't been familiar with computer language before. They don't explain simply how to get from one place to another. For example, the manual doesn't explain, simply, how to get your automatic paragraphing. It isn't an easy thing to understand.

"It takes so long to do it yourself, if you observe the proper principle of working from A through to Z in the instruction manual."

Tuckey's output hasn't yet increased because he feels he works much faster on his typewriter.

"It's nowhere near as fast as a typewriter," he says.

## Clean Copy Advantage

"It's slower because I'm a two-finger typist and I'm probably twice as fast on a typewriter as I am on the Osborne. The advantage with the computer, though, is that at the end of it you get clean copy. For so many years the publishing industry has been used to dealing with sub-edited copy with corrections scrawled all over it. Delivering clean copy is a luxury that can save a publisher money. But I still use the typewriter for writing anything less than 2000 words.

"I'm getting a lot of copy from people outside motoring journalism; for example, contributions to a country music book I've been working on, which is written by about 40 different people and is almost at the thumbnail-dipped-in-tar stage for some of them. I'm actually subbing it by re-writing it straight onto the Osborne and it comes out clean in the end. That's the only advantage of the system to me – clean copy.

"I'm now looking at buying an electric typewriter because the feel of the keys is similar to the Osborne's keyboard. I've found that through using a microcomputer keyboard my typing on the manual typewriter is getting sloppier because of the difference in touch."

Bill Tuckey is quick to point out that his computer needs are different from those of the daily newspaper journalist.

"At the recent release of the new Holden Commodore, one of the journalists who is using an NEC portable computer had three stories written and through to his office via a modem in 45 minutes," he said. "He didn't have to sit on the end of a telephone line waiting for a copy taker, then dictate the whole thing slowly for her. The stories went down the line and straight into production. That was impressive." ❑

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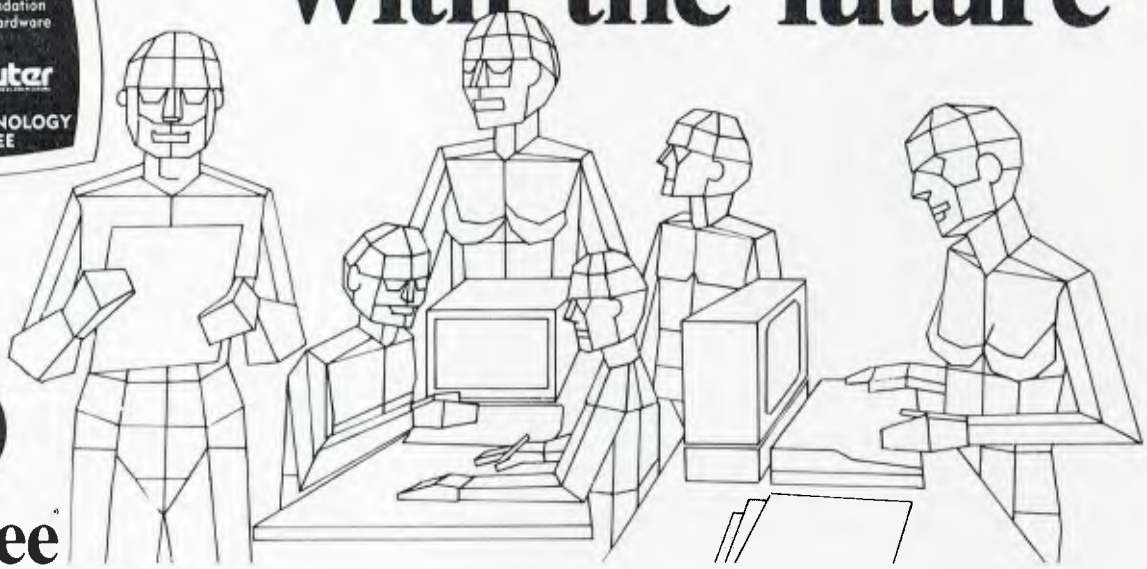

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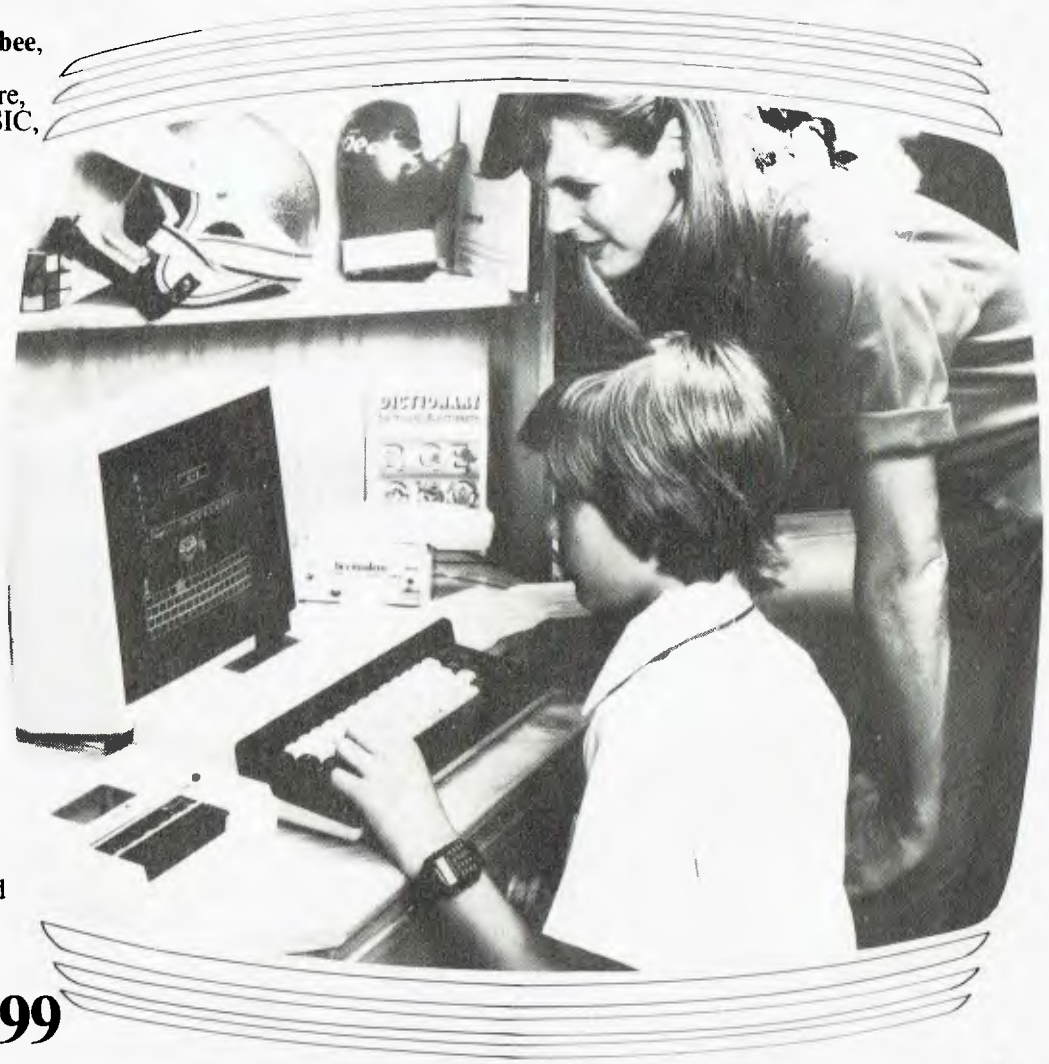

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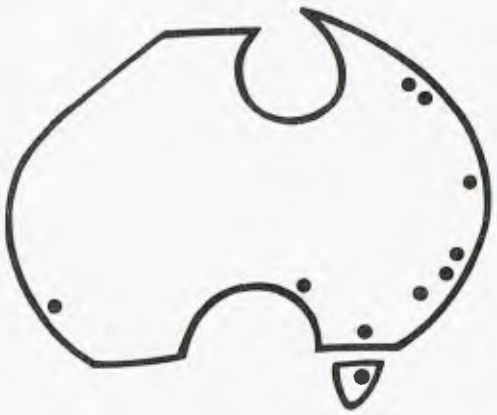

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# COMPUTING A TO Z

**Absolute:** Located at a fixed address in memory.
**Access:** To read or write from a location in memory, or a file, or disk.
**Accumulator:** The major register of a CPU, in which arithmetic and logical functions are performed. Some computers have several registers which can function as accumulators; in others some registers can perform a subset of the full set of operations.
**Address:** A memory location which can contain data or an instruction.
**Algol:** Algorithmic Language. An early computer programming language for mathematical applications. Widely used in Europe, it embodied early structured programming concepts and was a precursor of Pascal.
**Algorithm:** A set of instructions which define a method of obtaining some result (usually mathematical). A cooking recipe is an algorithm, as is a knitting pattern.
**Alphanumeric:** Composed of letters or numbers or both.
**Analogue (Analog):** Representation of a value by a voltage or some other measureable datum, rather than a binary or other representation based on counting.
**Apple:** The Apple II computer is a computer based on the 6502 microprocessor with an integrated keyboard. Noted for its colour graphics capabilities, which make it popular with schools.
**Application:** What you do with your computer. For example games, word processing and graphics.
**Array:** A set of values under a common variable name, which are accessed through a subscript. For example A[1] is the first item in array A, A[2] is the second, and so on. A[N] is the Nth item.
**ASM:** Assembler. Also a suffix added to assembly language file names under CP/M to distinguish them from other files with the same name.
**Assembler:** A program which converts assembly language into its corresponding machine (or object) code, which can be executed by the computer.
**Assembly Language:** A language in which each machine code instruction is represented by a short mnemonic which is much more comprehensible to the programmer. For example, the 8080 machine code

[10010110]

in binary, is

[SUBL]

(subtract L from accumulator) in assembly language. Each line of assembly language becomes one machine instruction.
**Assign:** To make one thing equal to another; for example, [A=B] assigns the value of B to A.
**Atom:** An indivisible component of data structure.
**Attribute:** A property possessed by some object, such as a file being read-only.
**Backup:** An extra copy of a disk, tape or file taken as a precaution against damage of the original.
**Backus Normal form:** A special language (a metalanguage) used to describe precisely the grammatical rules of another language.
**Base:** The lowest number inexpressible as a single digit in a given number system.
**BASIC:** Beginners All-purpose Symbolic

**Though we don't use computer jargon without explaining it to you first, other books and magazines you might want to read often do. This compact computer dictionary will serve as a quick reference for most of the things you'll need to know.**

Instruction Code. Invented in 1970 at Dartmouth College by Kemeny and Kurtz as a teaching language, it has since been enhanced in its more exotic forms into one of the most sophisticated yet easy-to-use languages available on personal computers. Its major rival is Pascal, which has the added virtue of stressing structured program design.

**BDOS:** Basic Disk Operating System. The major functional component of the CP/M DOS.

**Binary:** The base 2 system of counting used by digital computers.

**Binary Search:** A method of searching for an entry in a table by successively halving the table until all that's left is the desired entry.

**Binary Tree:** A form of data structure in which entries are tagged on at the end of the appropriate branches.

**BIOS:** Basic Input/Output System. The part of the CP/M operating system which is different for each type of machine and provides any special I/O routines for disks, terminal, printer, and so on.

**Bit:** Binary Digit being the basic unit of data storage. Either 1 or 0, off or on, true or false.

**Boot:** To load the operating system into the computer from a disk or tape, either initially or subsequently after running a program.

**Bootstrap:** To use one short program to load a longer loader program which then loads the operating system.

**Branch Instruction:** A program instruction which causes the computer to jump to another instruction, usually fairly close by.

**Buffer:** An area of memory used for temporary storage while transferring data to or from a peripheral such as a printer or a disk drive.

**Bug:** An error in a program. Makes programmers itch.

**Bus:** A set of wires over which data, addresses, or control signals are transferred between the central processor and memory or I/O devices.

**Byte:** A computer word eight bits wide. A byte in memory can hold a character or a binary number between zero and 255 (or −128 and 127), or a computer instruction.

**C:** A programming language, developed at Bell Labs, which is particularly convenient for writing system utility programs.

**Case Statement:** An instruction found in some high level languages which allows control to pass to one of several subroutines depending on the value of a variable. For example, the BASIC statement

ON X GOSUB 100, 200, 300

will jump to line 100 if X = 1, 200 if X = 2, 300 if X = 3.

**Call:** A jump to a subroutine which leaves the return address on the microprocessor stack, so that when the subroutine is finished executing, control returns to where it left off.

**CBASIC:** A commercial version of the BASIC language, running under the CP/M operating system. Doesn't use line numbers on every line, and is compiled, rather than interpreted like Microsoft BASIC.

**CCP:** Console Command Processor. The part of the CP/M operating system that reads a command line and sorts out what it means.

**Chain:** To automatically run one program after another.

**Character:** A letter or number, or in some circumstances a control code such as 'carriage return'.

**Checksum:** A running total of the characters in a file, recorded or transmitted with the file so that errors can be detected.

**Code:**

Absolute: Machine instructions which are intended to be loaded and executed in a particular area of memory.

Object: Machine instructions, as distinct from the source code from which it was generated.

Re-entrant: Code which can be loaded and run anywhere in the computer's memory.

Source code: A program written in assembler, or a high level language such as BASIC, which must then be assembled or compiled to produce the object code which can actually be executed.

**Cold Boot:** To start up a system from scratch, loading the operating system from disk or tape.

**Cold Start:** See Cold Boot.

**COM file:** In CP/M parlance a command file; that is, a machine code program that can actually be run.

**Command:** An instruction from the console for the system to do something.

**Comment:** A note added into a program to help the reader (or programmer) to understand its operation. Does not affect the program's execution in any way.

**Compiler:** A program which accepts as input a source file written in a high level language, and produces as output an object file containing the machine instructions which are actually executed.

**Computer:** Are you serious?

**Concatenate:** To join two strings together, one after the other.

**Conditional:** A test; for example, is X greater than Y: IF X is greater than Y THEN GOSUB 500 (BASIC)

or, if the carry flag is set, jump to location

NEXDIG:

JC NEXDIG (Assembler)

Conditionals are one of the most powerful features of any computer language.

**Console:** The keyboard and screen from which the operator controls the computer.

**Control characters:** Codes which perform functions like acknowledging correct receipt of a message or requesting retransmission of an erroneous message. Control characters are defined as part of the ASCII and similar codes.

**Copy:** To duplicate, usually for backup safety.

**CP/M:** A disk operating system for 8080 and Z80 based microcomputers. Allows the user to store information and programs in named files, as well as managing disk storage and input/output functions. Other disk operating systems include TRSDOS (on TRS-80) and DOS 3.3 (for Apple).

**CRT:** Cathode Ray Tube. Usually refers to the screen of a video terminal or the

**Data:** Information to be processed by, or output from, a program.

**DDT:** Dynamic Debugging Tool. A Microsoft program that assists the user to find errors in machine code programs.

**Debug:** To locate and fix errors.

**Decimal:** Based on ten.

**Delete:** To erase.

**Device:** A piece of equipment such as a printer or tape drive which the computer uses.

Directory: A list of the programs on a disk (or occasionally tape) together with necessary information, such as length and location.

**Disk:** A flat, circular magnetic surface on which the computer can store and retrieve data and programs. Is fast compared with tape, particularly when access is not one item after another.

**Disk Drive:** The mechanical assembly which rotates the disk and positions the read/write head.

**Disk Operating System:** A program which operates one or more disk drives automatically and manages the system.

**Display:** The computer's output device at the console, usually a TV-like display of letters and numbers; sometimes the computer can produce graphics (charts and pictures) on the display.

**Double Density:** A method of recording twice as much information on a floppy disk requiring a higher quality recording surface than on a single density disk. ▷

**Echo:** When the computer inputs a character from the keyboard, it then sends it back to the display so you can see it was received correctly.
**ED:** An editor program; part of CP/M.
**Editor:** A program which lets you alter and correct source files and other documents.
**Erase:** See delete.
**Error Message:** Tells you something went wrong, and sometimes what.
**Execute:** To run a program; to follow its instructions.
**FIFO:** First in, first out, typically a paging algorithm for a program being used in a virtual memory operating system..
**File:** A continuous collection of characters (or bytes) saved on a disk or tape for later reloading.
**Fixed point:** Counting in integers only. Usually limited to small values, and restricted in accuracy, giving rise to ridiculous answers such as 9/5 = 1.
**Flag:** A variable, sometimes a single bit, which can have only two values and is used to indicate some condition.
**Floating Point:** The kind of arithmetic used in scientific calculators.
**Floppy disk:** A disk, made of thin, flexible mylar, and enclosed in a card jacket, which can be used for magnetic storage. There are three varieties, 9 cm, 13 cm and 20 cm. These can typically store somewhere between 140,000 and three million bytes (characters).
**Focal:** Formula Calculator. A simple language rather like a small BASIC, found on some mini and microcomputers.
**FORTRAN:** Formula Translation. One of the first computer languages, and beginning to show it, although still the king of the scientific or number crunching languages.
**Function:** A sub-program that processes variables in some well-defined way.
**Garbage Collection:** The process of going through memory or disk space, reclaiming all the redundant used space.
**Global:** A variable which is known to all the parts of a program. See local.
**Grammar:** The formal rules of a language.
**Hard disk:** A disk made of hard material, which is larger, faster and more fragile than a floppy disk, but capable of storing 70 million bytes or more.
**Hard Copy:** Printout.
**Hardware:** The bits of a computer you can kick, as opposed to the programs you can only swear at.
**Hashing:** A method of reducing the size of a table which otherwise would have mostly empty entries.
**Hexadecimal:** The method of counting to the base sixteen or the method of splitting binary digits into groups of four, which is the same thing. In hex, you count: 0 1 2 3 4 5 6 7 8 9 A B C D E F 10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1F 20 21 22.
**Identifier:** A label, or the name of a variable.
**Iff:** If and only if.
**Index:** A variable which usually points to an entry in a table or list.
**Index Register:** A processor register which is used to access tables and lists in memory.
**Indirect Addressing:** Referring to a variable which actually contains the address of another variable.
**Input:** To get data into the computer.
**Instruction:** A step the computer can perform.
**Integer:** A whole number.
**Intermediate Code:** A special kind of object code which cannot be run directly on the computer, but must be interpreted.
**Interpreter:** A program which examines source code a line at a time, decides what it means, and then does it. Compare with compiler.
**Interrupt:** To electronically drag the computer away from what it is doing in order to respond to some time-critical situation.
**I/O:** Input/Output.
**Jump Instruction:** Normally, control proceeds from one instruction to the next, one after the other. A jump instruction passes control, not to the following instruction, but to some other. Jumps can be conditional.
**Kilo-:** Prefix meaning one thousand.
**Kilobyte:** 1024 bytes (Kbyte).
**Kilobaud:** 1000 baud (kbaud).
**Label:** A word which identifies the destination of a call or jump instruction, or simply identifies some location in memory.
**Language:** The set of instructions, and rules for stringing them together, which you use to instruct the computer what to do.
**Library:** A set of programs, or sub-programs that can be called from your program so you don't have to waste space with a block of commonly used code, for example, a date routine can be held in a library.
**Line Number:** A number at the beginning of a line, which identifies it in a similar way to a label.
**Line Printer:** A high-speed printer for computer output.
**Link:** Part of a data item in a list, which tells the computer the location of the next data item.
**LISP:** A list processing language, much favoured by the artificial intelligence community.
**List:** A sequence of consecutive data items.
**Load:** To transfer some data or program into the computer memory.
**Locate:** To 'fix' a relocatable code so it will only run if loaded in a particular location.
**Logical Device:** A device as the computer 'sees' it: what the computer regards as the 'list device' may be one of several 'physical devices', such as a line printer or teletype.
**Loop:** To repeatedly execute a sequence of instructions; part of a computer program that is so executed.
**Machine Language:** The binary codes the machine actually executes.
**Macro:** A user-defined sequence of instructions which can be inserted anywhere in a program. See Library.
**Macroassembler:** An assembler which can utilise macros.
**MBASIC:** Microsoft BASIC, the BASIC used in the TRS-80, PET, Apple II and so on.
Memory: Where the computer stores data and programs internally for fast access.
**Menu:** A display which offers the operator a choice of several alternatives.
**Microcomputer:** A small computer based on a microprocessor.
**MICROPROCESSOR:** The central processing unit of a computer, built into a single silicon chip.
**Mini-diskette:** A 13 cm floppy disk.
**MP/M:** A multi-user version of CP/M.
**NAD:** A name and address file maintenance program.
**Number Cruncher:** Machine specifically designed to perform arithmetic operations at high speed.
**Numerical analysis:** The art and science of number crunching.
**Object code:** Machine code.
Object file: A file containing object code.
**Object module:** An object file containing part of a program, ready to be linked to others.
**Octal:** The system of counting to base eight, or grouping bits in threes.
**Offset:** To give the operating system the characteristics of a file so that it can subsequently read or write it.
**Operand:** The number an operator (+, ▷

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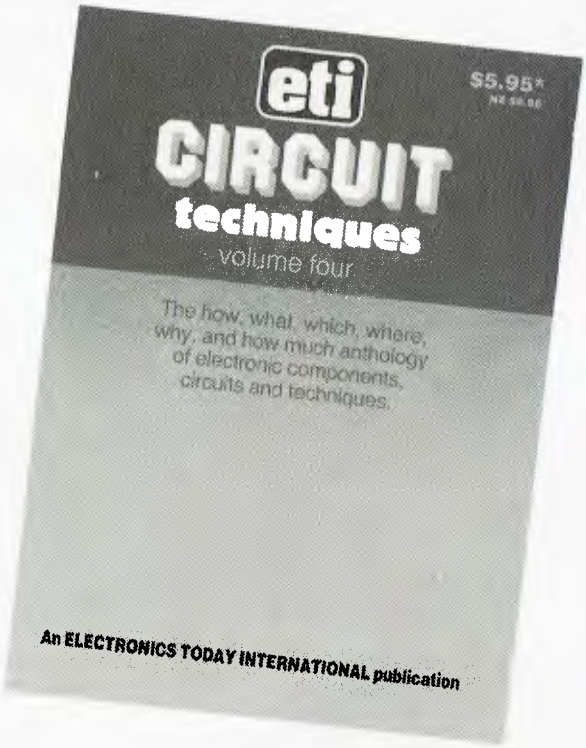


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, and so on) operates on.
**Operator:** An arithmetic function or some other function which alters variables.
**Optimisation:** Making a program work better (or faster, or using less memory).
**Output:** What the system produces.
**Packed Data:** Data which shares the same address, and has to be unpacked before use.
**Page:** A length of memory, typically 256 bytes.
**Parameter:** A constant which sometimes has to be varied.
**Parity:** An extra bit on the end of a character or byte for error detection.
**Pascal:** A modern structured language which may eventually rival BASIC in popularity or microcomputers.
**Password:** A secret word the system may demand of you before allowing you access to certain (or all) programs or data.
**Patch:** A temporary (ha, ha) fix on a bug.
**Peripheral:** A piece of equipment the computer uses, like a printer, disk drive, or modem.
**Peripheral driver:** A program which outputs data to a peripheral and controls it.
**Physical device:** See Logical Device.
**PIP:** Peripheral Interchange Program. A CP/M utility for copying files between devices.
**PL.1:** Programming Language /1. A good general purpose commercial language.
**Pointer:** A variable used for indirect addressing.
**Polish notation:** A method of separating operators and operands; for example, + 5 4 is Polish notation for 4 + 5.
**Poll:** To ask a peripheral if it requires service.
**Postfix notation:** Also known as Reverse Polish Notation, this is similar to Polish; 4 5 means 4 + 5.
**Preprocessor:** A program which does part of a job to make life easier for the program which follows; for example, a macro processor before an assembler.
**Priority:** The resolution of which interrupt is serviced first if two should arrive at the same time.
**Process:** A program.
**Program:** A sequence of instructions which can be understood, and ultimately followed by a computer.
**Prompt:** A message asking the operator or user to supply information.
**Queue:** A list in which entries are made at one end, and removed from the other.
**R/O:** Read Only; cannot be overwritten.
**RAM:** Random Access Memory.
**Random Access Memory:** The computer's internal memory which is used to hold running programs and data. The computer can both write and read RAM.
**ROM:** Read Only Memory
**Read Only Memory:** Internal computer memory used to store programs, which cannot be erased or overwritten.
**Reader:** Paper tape input device.
**Read/Write head:** The small coil which reads and writes on the surface of a disk.
**Reconfigure:** To reorganise the I/O or other aspects of a system.
**Record:** A set of related data items. For example, an employee's name, address, payroll number and pay rate would form a record.
**Recursion:** The ability of functions in some languages to call themselves.
**Redundant:** Not needed or taken for granted.
**Re-entrant code:** Code which can be used by several programs simultaneously, keeping separate data for each.
**Register:** A location in the processor capable of performing logical or arithmetic functions on the contents.
**Relocatable:** Capable of being moved in memory.
**Relocatable object module:** Part of a larger program consisting of many such modules, all linked together and located.
**Resident:** Permanently in the system.
**Reverse Polish notation:** See Postfix.
**RPN:** See Reverse Polish notation.
**Run:** To execute a program.
**Save:** To store a program on disk or cassette (particularly BASIC).
**Schedule:** To decide at what stage a process should run (of an operating system).
**Screen:** See CRT.
**Sector:** A section of data on a disk.
**Simulation:** Making one system behave like another.
**Software:** Programs.
**Source code:** The original text form of a program.
**Source file:** A file of source code.
**Source language:** The language the source code is written in; for example, BASIC, Assembler, C.
**Sort:** To arrange items of data in order.
**Spool:** To output a file to a peripheral, usually either a printer or tape.
**Stack:** A list in which both entries and removals are made at the same end. A microprocessor usually has a hardware stack which is used to save subroutine return addresses, temporary storage of data, and to pass variables between subroutines.
**String:** A sequence of characters.
**Submit:** To put the system under control of a file of system commands.
**Subroutine:** Part of a program which can be accessed from several points within the program.
**Symbol:** The name of a variable or a location in memory.
**Symbol table:** A table constructed by an assembler or compiler to give the addresses of all variables and labels in a program.
**Symbolic name:** A label.
**System:** A collection of hardware and software, possessed of the property that the whole is greater than the sum of the parts.
**System disk:** A disk carrying the operating system.
**Teletype:** An electromechanical printer/keyboard.
**Timeshare:** Running several programs on a system simultaneously.
**Track:** The area under the read/write head during one rotation of a disk.
**Transfer:** To move data.
**Transient:** A program that is only in memory for a short time before being overwritten. Often, the only program that is not a transient is the operating system.
**Tree:** A list in which each data item may refer to several others.
**TTY:** See Teletype.
**Unix:** A multi-user, multi-tasking, multi-programming operating system, expected to appear on microcomputers before long.
**User:** One of the people connected to the computer.
**Utility:** A program of use to most users.
**Variable:** Named quantity that can take on different values.
**Verify:** To check that data written on a disk or tape can be read again correctly.
**Virtual Memory:** A technique allowing programs larger than RAM to run. Only part is in memory. Parts are swapped from an on line storage device as required.
**Warm boot:** To reload the operating system a second or subsequent time.
**Word:** The amount of data fetched from one memory location. Typically one byte, but can be two on recent processors.
**Word processor:** A system for manipulating, editing, printing and formatting text files.
**WordStar:** A proprietary word processing program.
**Write protect:** To remove the cover from the notch in a floppy disk so it cannot be written on.
**Zilog:** Manufacturer of the Z-80 and Z8000 microprocessors.
**Z80:** A popular 8-bit microprocessor. ❑

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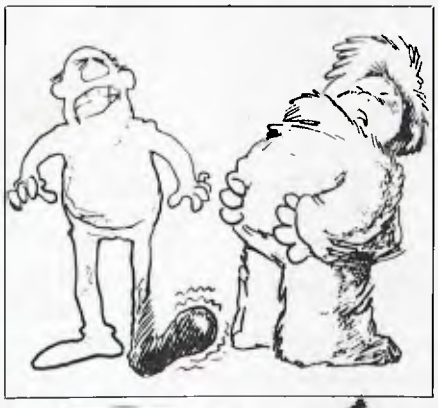
# Glossary Giggles

After a somewhat confusing tour through our real glossary of terminology, understudy office idiot Fred Symes began to wonder what had happened to good old plain English. So, armed with his twisted mind, he set about redefining a few terms.

**Array:** The little bit of sunshine the beginner experiences when he finally comprehends the first page of an operating manual.
**Assign:** "Beware of donkeys crossing the road."
**Atom:** A male cat.
**Binary:** Modern nursery rhyme language, as in ...
Ginary, binary bed,
The mouse ran up the LED.
**Byte:** What your friends put on you when you win the pools.
**CCP:** Comic Cut Papers; descriptive of programs produced by beginners and some experts.
**Chain:** Made obsolete by the Daisy wheel.
**Cold Boot:** What you get when you kick an eskimo.
**Control Characters:** Security guards at a punk rock concert.
**DDT:** An advanced state of alcoholism.
**Double Density:** The permanent state of mind of the office idiot.
**Execute:** Positive action required when dealing with some programmers.
**FIFO:** Abb. for a giant computer, as in ...
Fe Fi Fo Fom,
Oh my God – Facom
**Global:** The scale of domination sought by Reagan, Andropov, and to a greater degree, Robert Muldoon.
**Hard Disk:** Definitely not for beginners.
**Index:** Finger for the pulling out of.
**Interpreter:** One is desperately needed to turn computer language into plain English.
**Jump Instruction:** The act of shooting at your opponent's feet.
**Kilobaud:** A person who knows 1000 risque stories.



**LISP:** Ita Buttrose, we love you.
**Machine Language:** HummmmmmZippHummmmZippHummmmm.
**Macro:** What you set a sprat to catch.
**Memory:** Umm, ah, er.
**MBASIC:** Programme language for the Mbanga tribe in deepest Africa.
**Numerical Analysis:** Proving that 2 + 2 really does make 5.
**Operand:** A South African coin specially minted for Oppenheim diamond transactions.
**Operating System:** What you have after a meal of prunes.
**Peripheral Driver:** The drunk who thinks the footpath is the F1.
**PIP:** What you get when your Apple malfunctions.
**Polish Notation:** If we told you the truth Al Grassby would sue us.
**Program:** In favour of metrication.
**Read Only Memory:** The art of conversation is dead.
**Read/Write Head:** A bony structure containing a brain that can't make up its own mind.
**Redundant:** What the publisher told me I'd be if I persisted with this nonsense.
**Relocatable:** Being able to find your clean socks in the same drawer twice in succession.
**Resident:** What you call the President after he's been to the toilet.
**Save:** Impossible on my salary.
**Source Language:** "In the beginning..."
**Sort:** If you get on to a good one, let me know.
**Symbolic Name:** How about 'idiot'?
**Teletype:** The range of phones offered by Telecom for use between strikes.
**Timeshare:** A communal watch for poor people.
**Tree:** Talk to your dog about it.
**Unix:** Collective noun for harem guards.
**Verify:**Thick upper leg.
**Write Protect:** Instruction to write 'protect'.
**Zilog:** A new character soon to appear in the Buck Rogers series.
**Z80:** Comic speech bubble language denoting 80 winks rather than the usual 40. ❑

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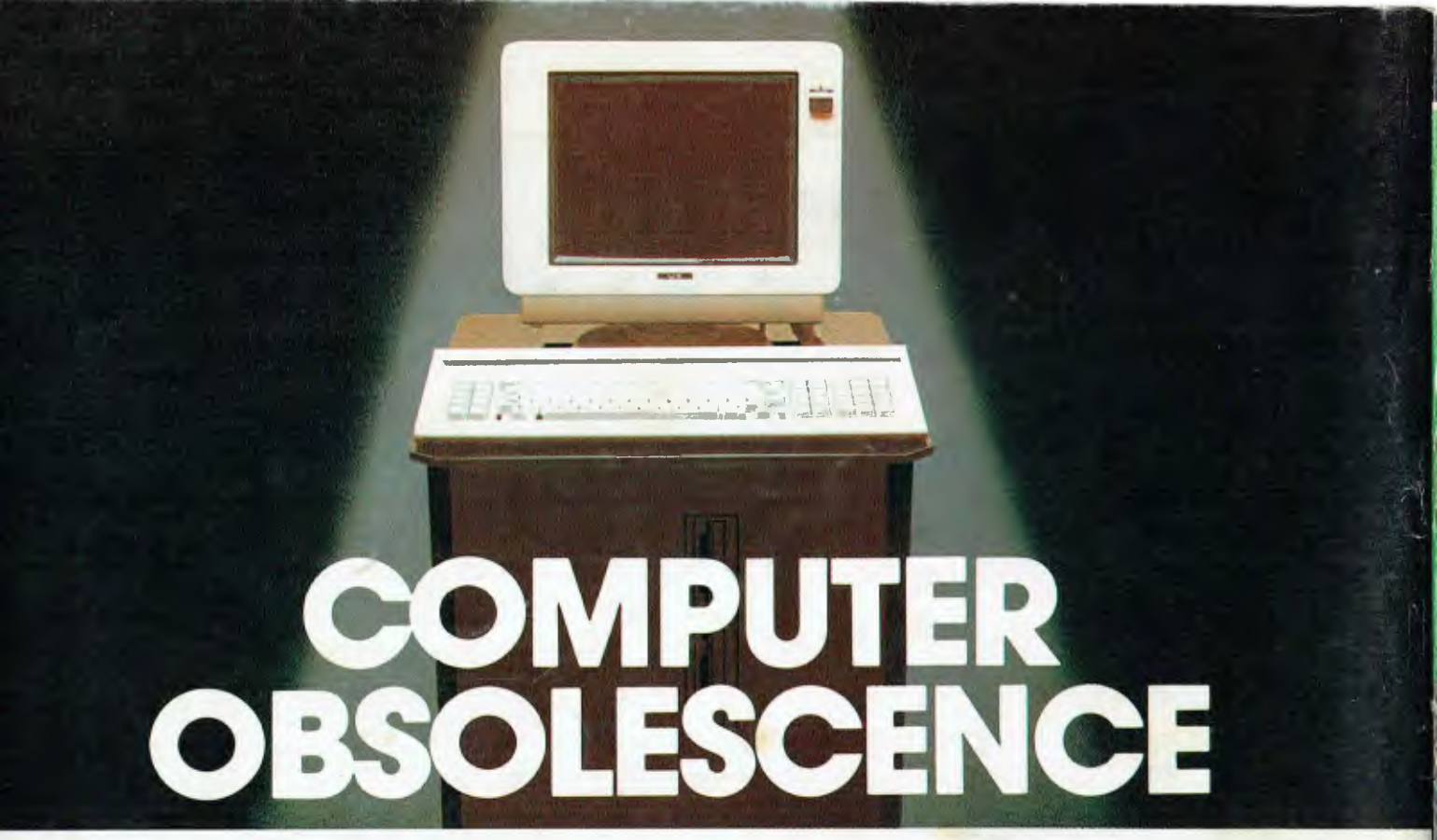

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